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When a report comes to the head of a car department that four air-brake hose have been applied to the same car at the same interchange point on the same day and the car finally comes to the home road with the same hose it had on it when it set out on its stultifying career; when a report comes to the same office of four doors applied to a car which the records of the home office show to be a gondola; and when a roof is reported to have been put upon a flat car; the question is, if you are a master car builder or in any capacity responsible for car repairs, "What are you going to do about it?" Fortunately for all who may in future years be concerned in the matter, the question was answered on Tuesday and in terms which cannot be mistaken, in spite of the fact that every reasonable effort was made to soften the blow upon those who have been guilty of the contemptible practice. The answer is in the following resolution: "That all members of this association who have any evidence of dishonesty in the use of the repair card submit such evidence to the executive committee, who will undertake to investigate the whole matter thoroughly and handle it in such manner as seems best to the interests of this organization." There is no way in which the head of a car department can correct abuses of the repair card attached to his own cars on another road; he can correct abuses of the repair card as attached to another road's cars on his own road. Herein lies the remedy. It is to be regretted that the practices complained of have grown to such an extent that drastic action is the only thing available; but if a road, or a department or a man has so little of common honesty left in him or has such a mistaken notion of what will maintain or raise his standing with the road which employs him, it is time for him, and through him his road, to receive the kind of a jolt which will come from a complete exposure of the facts, with names and dates, to the Master Car Builders' Association. A man cannot be legislated into honesty; but a little publicity of his crookedness may have a decidedly deterrent effect upon his pursuit of the opposite course.

The M. C. B. committee on coupler and draft equipment reports the results of tests made on the Pennsylvania Railroad to determine the effect of coupler side clearance on flange friction and train resistance. It reaches the important conclusion that this clearance is not as important as generally supposed heretofore, and that the present standard minimum clearance, 2½ in. (total), should also be regarded as a maximum, as it is ample for sharp curves, and there is a liability of couplers not mating if more clearance is allowed without centering devices.

The tests were made with two dynamometers, one a special diaphragm dynamometer for measuring directly the coupler side pressure for clearances varying from ½ to 5 in. (total). The results showed a maximum pressure of 7,100 lbs. on a 20½-deg. curve with 1-in. clearance, 3,000 lbs. with 2-in. clearance and 1,600 lbs with 3-in. clearance. On a 13-deg. curve the side pressure averaged 3,000 lbs., with a drawbar pull of 25,000 lbs. The train resistance was determined by the regular P. R. R. dynamometer car. On the Cresson division, where the curves reach a maximum of 13 deg., it was found that the drawbar pull varied very slightly for different drawbar clearances as the following record shows: For side clearance, 1 in., average train resistance, 28,885 lbs.; 2-in. clearance, 28,992 lbs.; 4-in. clearance, 28,525 lbs., and 5-in. clearance, 29,303 lbs. The difference in the record for these four tests is about 500 lbs., or less than 2 per cent. We want to call attention to the fact that this important question is now regarded as settled by these careful experiments, and that the work of the dynamometer car has been regarded as sufficiently accurate for the purpose. In the report on side bearings and center plates is an outline of similar tests to determine the effect of antifriction center plates and side bearings on flange friction and train resistance. The dynamometer car of the University of Illinois and the service of a staff of attendants was offered free of charge by the university for the purpose of the tests. In the discussion of the report the use of the dynamometer car for such a purpose was discredited and not considered sufficiently accurate and sensitive, and this apparently decided the convention to discontinue the committee and abandon the investigation. There is some inconsistency in accepting the work of the dynamometer car in determining the flange friction due to coupler clearance, and in refusing to employ it to determine the flange friction due to various forms of center plates and side bearings. The committee should have been continued and the experiments made as outlined in their report, and by this time next year we would have had valuable information which might affect materially present practice in these important car details.

THE GRADING AND INSPECTION OF CAR LUMBER.

The railways use approximately 50 per cent. of the total production of lumber of the United States, and it represents to most western lines 15 to 20 per cent. of their total annual purchases of material. While there is a gradual approach to uniform grading and inspection of lumber for railway use, it has been difficult to adopt standard codes for such grading and inspection, and there is still a considerable lack of uniformity in the specifications for the several grades. Different associations have worked on the problem and papers on the subject have been read at the meetings of the Society for Testing Materials; the Maintenance of Way Association; the Railway Storekeepers' Association, and the subject is presented at this convention of the M. C. B. Association at the suggestion of the executive committee of the Storekeepers' Association. At the last meeting of that association a paper was read by M. J. McCarty, Purchasing Agent of the Rock Island, in which he showed at length the manner in which specifications for lumber differs on the various railways. Thus, for long leaf yellow pine car sills some lines require 90 per cent. heart; others 85 per cent.; while others admit 75 per cent. Some accept 2 in. sap on one corner, or 1 in. on two corners; others 2 in. sap on each corner; others 1½ in.

sap on two corners, and still others say it must not exceed 1 in. on two corners. For yellow pine coal car sides and ends one line requires that one side must be all heart and the other side and two edges may not exceed 50 per cent. sap. Another is satisfied with two-thirds heart on face, and heart on edges one-half the lengths. Another requires two-thirds heart on both sides, entire length.

These specifications differ also as to the kind and size of knots which will be accepted in sills or flooring. For car roofing most lines require "B, and better, pine;" others accept "merchantable pine," and still others require "No. 1 common pine." For car lining, "B, and better, pine" is generally used, while others are satisfied with "No. 1 common pine," and others "merchantable pine." For grain door lumber "No. 1 common pine" is generally specified, while some large systems are satisfied with "No. 2 common pine" for this purpose. For car oak there is a great variety in the requirements. Some use white oak only and many others admit red oak, and the definition of burr, post and chestnut oak are not clear or exact.

The Master Car Builders are requested to adopt uniform specifications for all grades of lumber used in car construction, and, if possible, to incorporate them in their code of rules, and the Maintenance of Way Association is requested to take similar action. While it is doubtful whether any such agreement can be arrived at for some time to come, the matter is of sufficient importance to warrant the appointment of a standing committee on the Uniform Grading of Lumber until some general agreement can be obtained.

The growing scarcity of lumber is, unfortunately, accompanied by the use of poorer grades, and it is time that the railways should make stronger efforts toward better methods of dealing with problem of securing good lumber at a fair price and some uniformity in grading practice would assist materially in this object.

CAST CAR WHEELS.

The report of the standing committee on car wheels was most excellent and at the same time decidedly radical in its suggestions and innovations. The details of some of the recommendations need little or no comment, as, for example, those relating to the modifications in the gages and the use of the same. It is quite natural, too, that this standing committee should find changes in the outline of the wheel, both in rim and plates, necessary from time to time, but it is quite remarkable that so great and marked a change as that of cutting the height of the flange down from 1⅛ in. to 1 in. should have been received and referred to letter ballot without a single objection raised or a single allusion made to it on the floor. Here is a detail that the association fought, bled and got exhausted over in the effort to establish it as a standard, and which has been doing service as such for more than thirty years, which is swept aside in a day and not a word uttered to retain it. It shows, at least, that the association is not bound by precedent, and that the members are thinking before they speak. To be sure, there is every reason for adopting the new standard, and nothing but fear and the reverence of our ancestors to retain it. Flanges of 1 in. in height have been used safely and successfully in Europe for many years, and in this country there are many electric cars running at high speeds in suburban and interurban service whose wheels have flanges of but ⅞ in. and ¾ in. in height, because of the necessity of operating over city lines with narrow or shallow flangeways.

The new flange has the same contour up to and beyond the gage line as the old one and then rounds over the crown in an almost imperceptible gothic, so closely does it resemble the semicircle to the eye.

The discussion, however, centered about marking wheels for identification. The committee recommended that all wheels be numbered consecutively and with the initials and serial number of the purchasing railway cast on the inside plate. The object of this was identification, but it was opposed, on the ground that it would not attain its object, and would probably work some hardship to the road whose initials were used in the case of discarded wheels that might be purchased at a bargain in job lots by a road less exacting or whose inspector was more lenient. Then a bill for the failure of such a wheel would be sent to the road whose initials it bears and be paid because of the difficulty of searching the records for that of a single wheel out of a million or more.

In connection with the subject of car wheels, though not bearing directly upon the committee report, the decision of the arbitration committee as to responsibility for brake burns is of interest. This was the subject of a topical discussion on Monday, and was referred to the arbitration committee, which reported back that a wheel that received what is known as a brake burn, was defective and the maker should be held responsible, a brake burn being understood to be a surface covered with a network of fine cracks. The reason for this decision was that a properly made wheel would not crack in this way when subjected to continued brake application. This may or may not be true. It is doubtful if there is sufficient information at hand to determine this definitely. The danger of injustice lies in the possibility of similar cracks being called brake burns when they are really caused by skidding. For example, a number of samples of injured and defective treads were submitted to the convention for inspection. One in which these fine cracks were very pronounced was passed around the hall and unanimously declared to be brake burned. Others were as evidently causes of shelling out, while there were others showing around spots of badly cracked and disintegrated material, which many called brake burns, and may have been such, but could have been produced by skidding at a low speed under a slight load. This cannot be disputed, because similar defects have been produced experimentally in this way. It may happen that a cast wheel, when skidded, will become treated to a sufficient extent to cause a burned spot to appear in the tread, and yet, if the skidding is stopped as soon as the heating occurs, there will be no flattening, but there will be a spot of from 1 in. to 2½ in. diameter that will disintegrate in just such a way as that which appeared in the specimens presented. If, then, skidding is unfair usage, it is more than probable that this ruling will have to be modified so as to recognize the possibility of making a so-called but misnamed brake burn by skidding.

The work of the committee was well done, and it does not seem probable that there will be a reversal of it or a failure to adopt the recommendations.

MR. VAUGHAN'S SUGGESTIONS.

If the Master Mechanics' Association does the work during the coming year that was suggested in its president's address and recommended as worthy of execution by the committee appointed to report on the matter, it will have done much to warrant its existence and will have added to its notable achievements of the past. The first point, that of discussing the articulated Mallet compound locomotive from an operative standpoint, will, perhaps, be impossible if road conditions are to be included, as the work in that direction has, thus far, been very limited; though those who have used the design for pusher service and on mountain grades have been strong in their commendations. As for road service with these engines, it will probably not be long before we will have had some definite experience. The Clinchfield, the Virginian and the Southern Pacific will try the machine out, so that in two or three years we will know definitely whether the articulated is to supersede the older types of heavy locomotives for road service or not. The report on the electric locomotive ought to be very valuable, if it does nothing more

than collect the data concerning the examples in service. To be sure, no work has yet been done involving long runs, but even on the short runs on which the electric locomotive is used there are great diversities of opinion regarding its efficiency and economic value. To sift out the accounts and give a clean, straightforward account of the performances mechanically and commercially would be of very great value and give information that no one, as yet, has obtained.

But, perhaps the most valuable recommendation that was made, as far as the association itself is concerned, was that of enlisting the railway clubs to act as feeders and contributors to the fund of detailed technical work of the association, just as they are already utilized by the Master Car Builders' Association to thresh out the annual suggestions regarding the interchange rules.

If the proceedings of the association are consulted, it will be seen that they have, year by year, grown away from the discussion of minor details of locomotive construction and broadened out into the wider field of general locomotive engineering, yet it is quite as essential to-day as it ever was that details should be discussed and worked out to the best possible form. That this may be done there must be an intelligent interchange of opinion and experience. There is no doubt that the monthly meeting of the railway club is a more appropriate place to do this than the general annual convention. The question is whether the clubs will consent to take up this class of work now that most of them have had a taste of or have grown into the custom of having papers presented that might well grace the proceedings of any scientific association in the world. That will probably be the trouble that will be experienced in the execution of this plan, commendable as it may seem.

As it stands now, the old railway club discussion as to the use of cast-iron or malleable iron for center plates, for example, where there was a long and somewhat wordy experience meeting, with a mass of contradictions and irrelevant opinions, has given way to the presentation of a paper by an expert, discussed by a selected number of experts, who, when they have spoken, have so covered the subject or occupied the time available for discussion, that there is no time or place for the utterer of ill-digested ideas. It would seem that these clubs would hardly relish the assumption of the subordinate position which they might be asked to take. However, it is worth trying for.

That other suggestion, that some systematic plan for stating locomotive operating costs should be devised, is a still further exemplification of that broadening of the work of the association and the comprehensiveness of the results that are attained, and checks in well with what has gone before.

Finally, we have heard so often of the suggested amalgamation of the two associations that we are apt to look upon it as the echo of a twice-told tale. There is so much to be said on both sides of the question that it will be as impossible to reach an immediate decision as it was when the suggestion was made two decades ago. The two are so closely allied that even an amalgamation could not bring them much closer together, unless it were to divide them into sections that should hold separate meetings at the same time. This could hardly be to the technical advantage of the combination if we are to judge by the achievements of the other associations that have adapted this method of procedure. Yet the present system of extending the conventions over nearly two weeks is a serious obstacle to a busy man.

SUPERHEATED STEAM ON LOCOMOTIVES

A short time ago a small book on the application of highly superheated steam was published, and the author took such a decided stand that his ideas seem worthy of a more extended review than was possible in connection with the notice of the book. The author, Herr Garbe, has, for many years, been prominent in connection with German railway work, and under his auspices the first real investigation of the action of the blast on the gases in a locomotive smokebox was carried through. Of late years Herr Garbe has been identified with the introduction and development of the Schmidt superheater on the Prussian State railways. This experience has made him an enthusiastic advocate of highly superheated steam, and by this he means steam that has been raised to at least 180 deg. Fahr. above its proper saturation temperature. One of the reasons given for this advocacy is that "if the steam is not properly superheated, that is, if it contains unmixed particles of both wet and superheated steam, the temperature indicated by the thermometer will be that of the average of the mixture, but the effect will not be equivalent to a uniform superheat at the temperature." According to the author's experience, an average temperature of 570 deg. Fahr. in the slide valve chest must be maintained in order to insure the homogeneity of the superheated steam or its freedom from intermixed wet or saturated portions. Repeated trials have shown that the coal and water consumption are considerably increased whenever the temperature falls to any appreciable extent below that figure.

In order to meet these requirements great care must be taken in designing the superheater so that gases of a sufficiently high temperature may be used to do the work, and the heating surface must be so split up that all of the steam comes in contact with the heated walls; else, because of its low conductivity, especially when superheated, a sufficiently high temperature will not be obtained. Then, as auxiliary to this condition, the gases must be so controlled that the superheater pipes will not be overheated when they are empty. Finally, because of the wide variations in temperature of the different parts, it is of the first importance that there should be a flexibility of construction so that the variations in expansion will not put such an undue stress on any of the parts as to produce leaky joints.

Speaking from the standpoint of experience on the Prussian State railways, the author states that the "saving in coal, due to the absence of cylinder condensation, in a simple engine using highly superheated steam, averages about 25 per cent. when compared with that of a saturated steam locomotive of the same weight, and is in the neighborhood of 20 per cent. when compared with a two or four-cylinder compound engine. The saving in water is, in most cases, considerably larger, because a greater quantity of fuel is required for the production of 1 lb. of superheated than for the same quantity of saturated steam."

It appears that on the German roads the possibility of increasing the hauling power and speed of the locomotives by the use of superheated steam has been turned to good account, and the complications of the compound engines have thus been avoided.

But, when the superheater has been so designed as to deliver steam of the proper condition, it is essential that in order to use it all parts of the engine with which it is brought in contact should be so constructed as to suit the special properties of the medium. It is probably because of the minute attention that has been given to these details that Herr Schmidt has been so successful in the introduction and operation of his apparatus. The cylinders are so designed that sudden alterations in the section of the metal are avoided; the body of the steam chest is kept entirely separate from that of the cylinder; a nearly frictionless piston is used with its whole weight carried by the crosshead and tailrod, and the piston packing and stripping box are consequently relieved of all load; especial forms of packing are used and the valves have been designed particularly for use with superheated steam.

As for the lubrication, it is recognized to be a matter of prime importance. The high temperature makes it necessary to use only pure mineral oils having a particularly high flash

point, and a definite quantity of the lubricant must be supplied to the rubbing surfaces, the amount being determined by the speed of the engine. This entails the use of pumps delivering a fixed quantity of lubricant per revolution, and this is insisted upon as an indispensable condition to satisfactory operation.

Then, when all of this has been done, the working of the engine requires greater care than that of a machine using saturated steam. It is most emphatically urged that the oil pumps should be tested before starting on a run, that the superheater valves be kept clean; that the smokebox be tight; that the cylinder cocks be kept open until the pyrometer indicates a temperature of at least 400 deg. Fahr.; that the throttle be opened gradually; that the cut-off never be made at an earlier point than one-fifth the stroke; that the average amount of superheat be kept as nearly as possible at 600 deg. Fahr., and never be allowed to rise above 660 deg. Fahr.; that the temperature be ascertained by a pyrometer, and that after every trip the superheater tubes be cleaned of soot and ashes.

Apparently, according to Herr Garbe, the construction and successful operation of a locomotive using superheated steam is not so simple a matter as it might seem. But when the proper precautions have been taken he believes that success will be assured, and that a saving of from 20 to 25 per cent. in coal as compared with the simple two-cylinder locomotive will be the result.

Following closely upon the quick disposal of the old standard car wheel flange came an equally rapid adoption of a revised constitution for the Master Car Builders' Association. It was not, however, the proposed constitution as originally printed, but one with the objectionable provisions modified or changed. The principal points are those of dropping active members who have ceased to be employed in railway service, and subordination to the American Railway Association. Although members leaving railway service lose their vote, if eligible (and most of them are) they may become associate members and the limit of associates has been raised from twenty to fifty to accommodate the influx, while past presidents are to be eligible for election to a life membership. The connection with the American Railway Association, which it was feared would put a dampening effect on the work of the car builders, has been limited to subjects involving legal, transportation, permanent way or traffic questions, which, it was urged, did not constitute any part of the functions of the car builders' association. It was urged that the advantage accruing from this would be great, as the same principle when applied to technical matters would make it possible to secure a clean-cut co-operation between the different technical associations. For example, it would put the committee on car painting in touch with that of the Society for Testing Materials, which is at work along the same lines. These are the two items that have attracted attention and hostility, and their modification naturally did away with opposition, as it left the membership practically intact. The loss of vote by previous active members was not considered serious, while the association will still retain their services in technical work. So the measure was passed unanimously, with almost no debate.

Dr. Goss came in a little late, but it is all right. Even a man of his capacity sometimes finds difficulty in being in two places at the same time and the University of Illinois has certain claims upon him. Furthermore, unlike the Scriptural good people whose "works do follow them," his good works have preceded and have supplied some of the most valuable data that have been set before either association. But we were glad to see his face; it possesses a charm which we have never been able to find in the formulas and figures of his comprehensive reports.

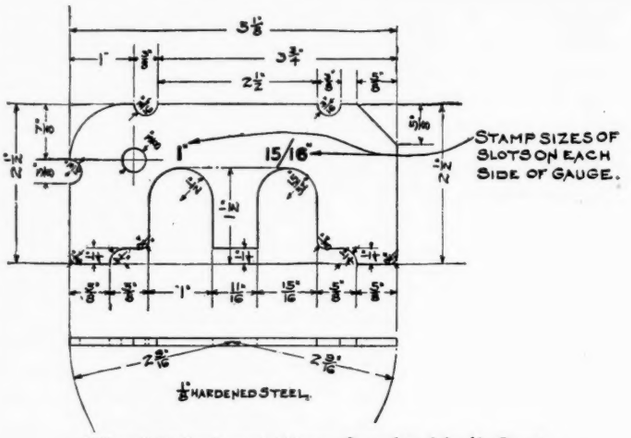
CAR WHEELS.*

Since the 1908 convention the scope of this committee has been largely increased and now includes in its work Steel and Steel-tired Wheels in addition to Cast-iron Wheels, which latter have heretofore occupied the entire attention of the committee from its formation to and including the report to the 1908 convention.

The 1908 report included a Wheel Defect and Worn Coupler Limit Gage, having two slots for gaging worn flanges, one slot being $1\frac{1}{16}$ in. wide and the other slot 1 in. wide. The committee, after further investigation, accepts the modification proposed in which these slots are made respectively 1 in. and $\frac{15}{16}$ in. wide and endorses as correct the wheel defect and worn coupler limit gage now appearing on page 7 of the 1908 Code of Interchange Rules, and the cuts showing the method of using same, as shown on pages 10, 11 and 12 of the same issue.

The shape of brackets or ribs on cast-iron wheels in the Report for 1908 were altered from the long radius type to a short radius type, the curve of the brackets being made such that the outer end of the bracket would flow into the rim at the back of the flange in a line following the circumference of the wheel, the bracket originating on the double plate portion in a line radial to the center of the hub. This shape of bracket has been adhered to for the promotion of good foundry practice and to prevent unequal construction strains, and the drawings presented by the committee in connection with this report include brackets of this form.

The question of regulation of foundry practice in the manufacture of cast-iron wheels to promote uniformity of product in the different sections of this country, also the question of proper chemical analysis for materials entering into these wheels, has during the past year received a full share of the



Wheel Defect and Worn Coupler Limit Gage.

attention of your committee working jointly with a committee representing the Association of Manufacturers of Chilled Car Wheels, which association, during the year 1908, was regularly incorporated and is empowered to act for the wheelmakers who are members of this association.

The result of the conference on the regulation of foundry practice and chemical analysis phases have in no wise settled the subject, and the committee has, at the solicitation of the wheelmakers' committee, agreed that the study thus far has not been sufficient to permit the formation of a recommendation. It, therefore, reports progress on this portion of the work and asks another year's consideration before submitting any definite recommendations.

It submits, as an appendix, extracts from the Record of Proceedings of the Association of Manufacturers of Chilled Car Wheels, submitted to the committee, which deals with the subject from the view-point of the manufacturers, and the items contained therein will be taken up and dealt with later in accordance with the conclusions reached by your committee.

From the convention of 1908 to and including the present time, the committee has directed its attention to instructions received from the Executive Committee, namely:

(a) To prepare drawings showing the limit of wear of solid-rolled steel wheels in connection with the minimum thickness for steel tires shown on Sheet M. C. B.—A.

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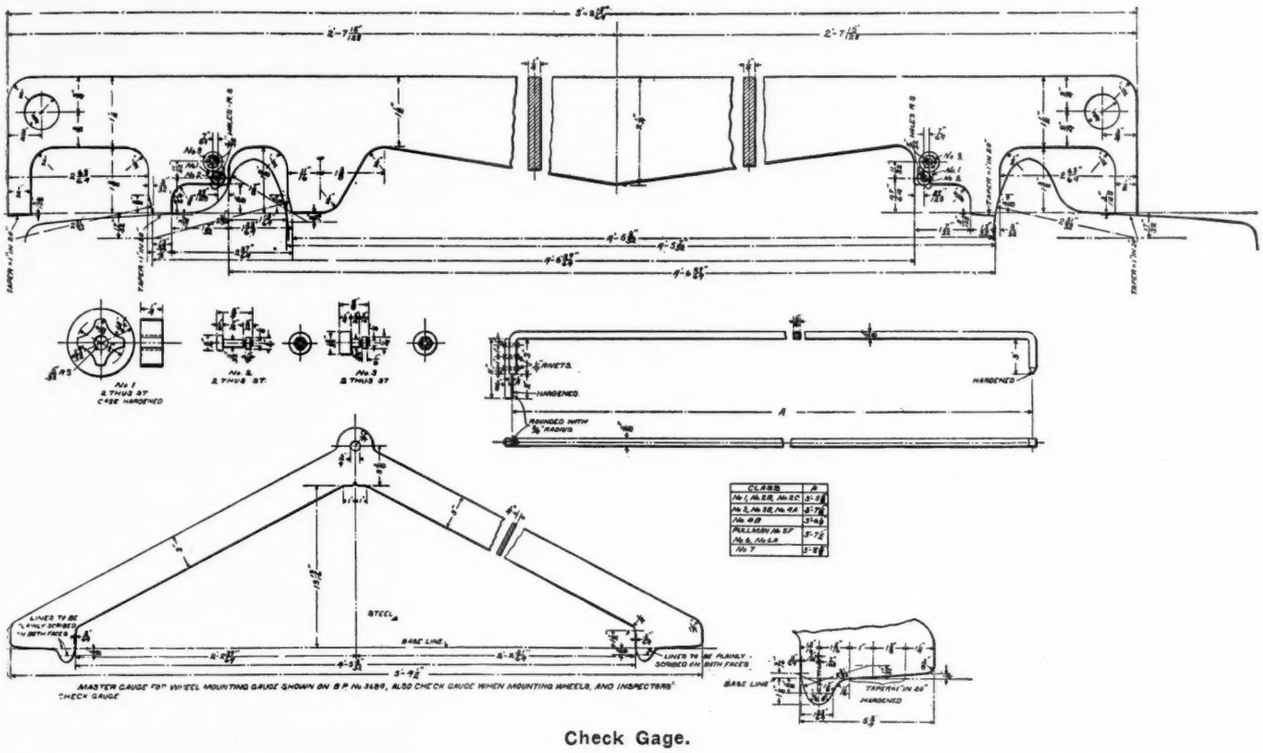
*Abstract of a report presented at the annual convention of the Master Car Builders' Association. Committee: William Garstang (chairman), W. C. A. Henry, A. E. Manchester, R. L. Ettenger, O. C. Cromwell, W. E. Fowler, R. F. McKenna.

(b) To confer with similar committees from the Master Mechanics' and Maintenance of Way Association on the widening of gage on curves, owing to the fact that the minimum tread of car wheels has an important bearing on this subject.

(c) To confer with the committee of the American Engineering and Maintenance of Way Association regarding the allowable length of flat spots on car wheels in connection with the effect such defects produce on bridges and track, and to report back to the Executive Committee regarding the procurement of apparatus for making tests.

(d) The action of the convention on your report was that it be referred back to the committee for further investigation.

The committee's attention has been called to corrections necessary in the M. C. B. Specifications for Cast-iron Wheels relating to the form of chills, weights of wheels, and the necessity of casting the initials of the railway or private line company on all wheels used in interchange service, and has also been directed to a necessary change in the form of the double plate portion of the 60,000 pounds capacity wheel from that now shown in the 1908 Proceedings, to insure sounder wheels than are now produced from the drawings for this wheel.



Check Gage.

Considerable comment has been directed against the slight taper at the sand rim in the present tread contour on account of "chipped rims"; also evidence has been presented showing that a greater mileage could be secured from all wheels if the sand rim taper were increased and lengthened toward the flange, and that further freedom from broken flanges would result if the height of the flange "when new" was reduced, owing to the fact that shorter flanges would not be as apt to strike fillers in track, when a wheel having a tread worn hollow passed over a frog where the head of the rail had been worn down considerably.

Attention has also been directed to subject matter pertaining to gages, also the text in the Standards and Recommended Practice now appearing in the Proceedings and in the Rules of Interchange, all of which must be corrected to prevent confliction and will be dealt with in the recommendations contained in this report.

Consistent action on the part of the committee, in view of the fact that its 1908 report was recommitted, will be to condense the 1908 report and the report for 1909 into one and present them at the 1909 convention. The conclusions of the committee on all points involved for both years appear in the following recommendations.

RECOMMENDATIONS.

Cast-Iron Wheels.

1. The cancellation of present cut, covering 33-inch, 600-pound wheel, now appearing on M. C. B. Sheet J of Recommended Practice in 1908 Proceedings, and the substitution of a cut reduced from that shown on drawing D-4994 covering the entire new form of 625-pound wheel for use under 60,000 pounds capacity cars.

2. The cancellation of the present cut covering 33-inch, 650-pound wheel now appearing on M. C. B. Sheet J of Recommended Practice in 1908 Proceedings, and the substitution of a cut reduced from that shown on drawing D-4995 for 675-pound wheel, which covers the present form through the hub, double-plate and single-plate parts, with the new form of tread and flange and curve of brackets added.

3. The cancellation of the present cut covering 33-inch, 700-pound wheel now appearing on M. C. B. Sheet J of Recommended Practice in 1908 Proceedings, and the substitution of a cut reduced from that shown on drawing D-4996 for 725-pound wheel, which covers the present form through the hub double-plate and single-plate parts, with the new form of tread and flange and curve of brackets added.

4. The cancellation of cuts covering wheel tread now appearing on Sheets 7 and 12 of M. C. B. Standards in the 1908 Proceedings and the substitution of a cut reduced from that shown on drawing D-4998.

5. The cancellation of cuts covering Maximum Flange Thickness Gage and Minimum Flange Thickness Gage now appearing on Sheet 12 of M. C. B. Standards in 1908 Proceedings and the substitution of cuts shown on drawing B-5005, which have been revised to show the new flange and tread contour proposed in this report.

6. The cancellation of cut showing Wheel Defect and Worn Coupler Limit Gage now appearing on Sheet 12 of M. C. B. Standards and the substitution of a cut reduced from drawing D-5006. The necessity for such change is referred to above.

7. The cancellation of the cuts showing Terms and Gaging Points for Wheels and Track, Standard Reference Gage for Mounting and Inspecting Wheels, Wheel Check Gage, Guard Rail and Frog Wing Gage, and Standard Reference Gage for Mounting and Inspecting Wheels (as used for inspecting), and the substitution therefor of cuts of the same gages shown on drawing WC-1907-4A at such size as will make all dimensions easily readable. This is imperatively necessary on account of an error of 1-64 inch shown in a main dimension in the original drawings for these gages and which made corrections necessary in several subdimensions. It is also necessary on account of a reversal of the word "Inspection" and "Mounting," in regard to the use of the Standard Reference Gage.

8. The cancellation of the Specification for 33-inch Cast-iron Wheels now appearing on pages 658, 659 and 660 of the M. C. B. Standards of the 1908 Proceedings, and the substitution of the Revised Specifications attached to this report, which has been corrected in reference to all points mentioned above.

9. The correction of the Text in the Standards and Recom-

mended Practice now appearing in the Proceedings and referred to above is as follows: (See page 635, 1908 Proceedings.)

Entry No. 4. To be corrected to read as follows:

INSIDE GAGE OF FLANGES is the distance between backs of flanges of a pair of mounted wheels measured on the base line.

Entry No. 5.—GAGE OF WHEELS is the distance between the outside faces of flanges of a pair of mounted wheels measured on a line parallel to the base line, but 5/8 inch farther from the axis of the wheels.

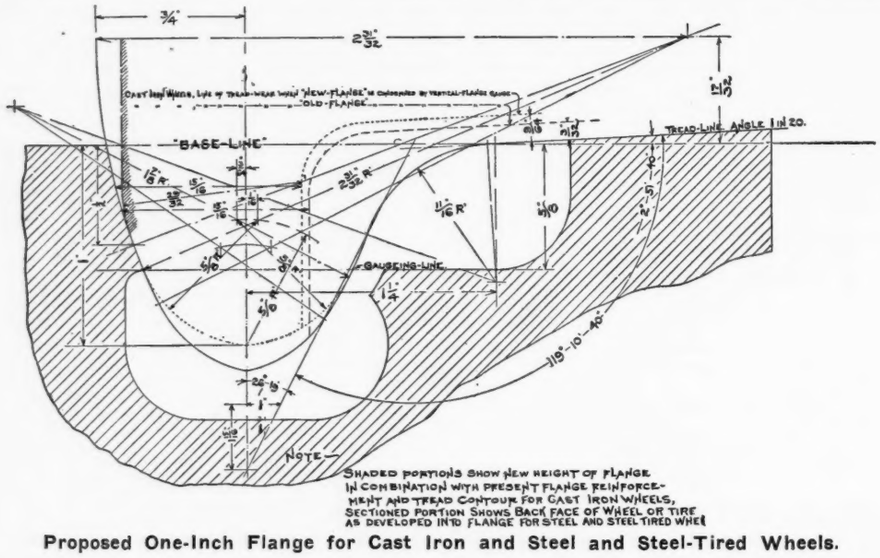
The dimensions in the Wheel Gage Distances given are correct with the exception of that now shown for the THICKNESS OF FLANGE. This should be corrected to read 1 15-64 inches.

Code of Rules Governing Interchange of Traffic.

A revised Form of Bill covering wheels removed and applied is presented, and it is proposed that this convention adopt the revised form as a standard, replacing the form now appearing on pages 496 of the 1908 Proceedings and 39 of the Code of Interchange Rules. The alterations appear as the 5th and 11th columns (from the left side) and consist in adding these columns covering "Railway Company's Initials or Name on Wheels," instead of omitting this information as per present form.

Rule 17 to be corrected to read as follows: Wheels loose or out of gage (see Fig. 6), for wheels cast prior to the M. C. B. Standard Tread and Flange adopted in 1907, or (Fig. 6-A) for wheels cast after January 1, 1908.

Rule 21, in the Code of Interchange Rules, refers to Figs. 2 and 2-A, the Fig. 2 representing the Maximum Flange Thickness Gage for wheels cast prior to the M. C. B. Standard Tread and Flange adopted in 1907, and the Fig. 2-A representing the Maximum Flange Thickness Gage for wheels cast after January 1, 1908, *but the rule does not so state*, and the committee proposes that the rule shall be revised to read:


"BASE-LINE"
TREAD-LINE. ANGLE 1 IN 20.
GAUGING-LINE.
NOTE—
SHADED PORTIONS SHOW NEW HEIGHT OF FLANGE IN COMBINATION WITH PRESENT FLANGE REINFORCEMENT AND TREAD CONTOUR FOR CAST IRON WHEELS, SECTIONED PORTION SHOWS BACK FACE OF WHEEL OR TIRE AS DEVELOPED INTO FLANGE FOR STEEL AND STEEL TIRED WHEEL

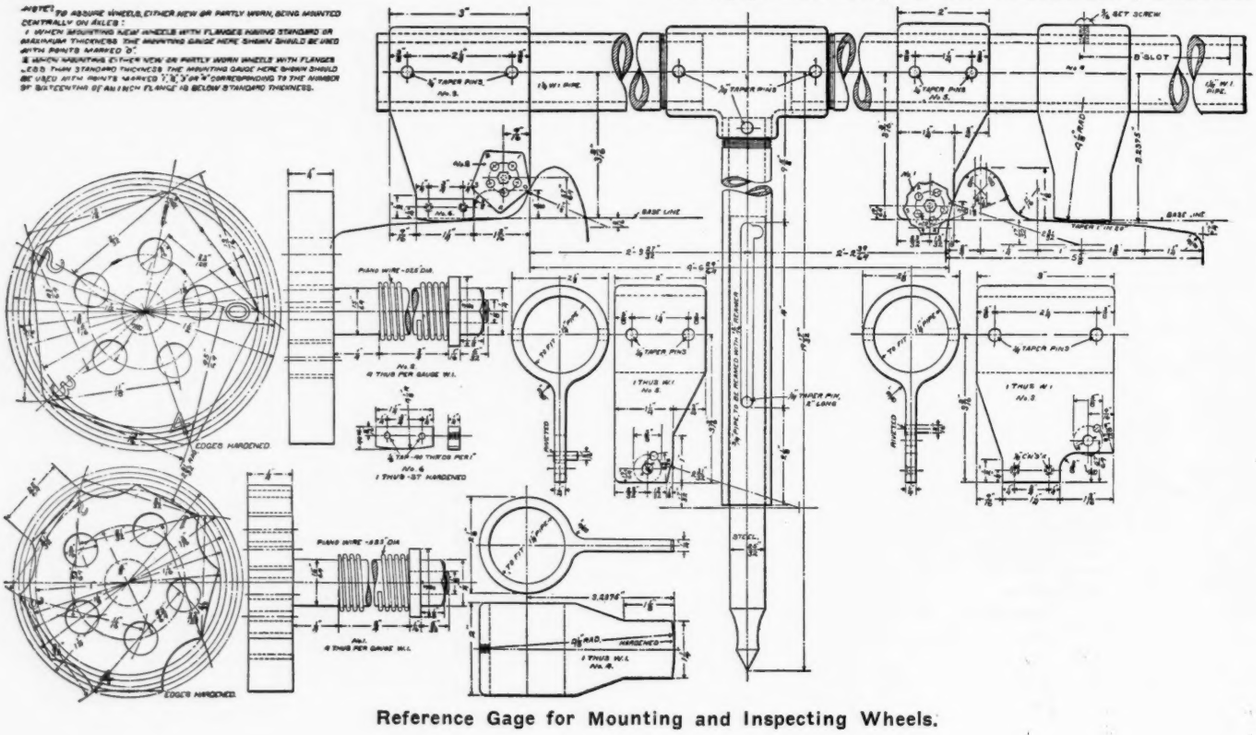
Proposed One-Inch Flange for Cast Iron and Steel and Steel-Tired Wheels.

"The determination of flat spots, worn flanges and chipped treads shall be made by gage, as shown in Fig. 1.

"The determination of thick flanges for all wheels cast prior to the M. C. B. Standard Tread and Flange adopted in 1907, shall be made by a gage shown as Fig. 2, and for all wheels cast after January 1, 1908, shall be made by a gage shown as Fig. 2-A."

From advice presented to the committee it is evident that the gage for detecting worn flanges is not being properly used, and Fig. 4, pages 478 of the 1908 Proceedings and 10 of the Code of Interchange Rules, should have the following added to protect against improper use, namely:

"This gage must always be held in horizontal position and



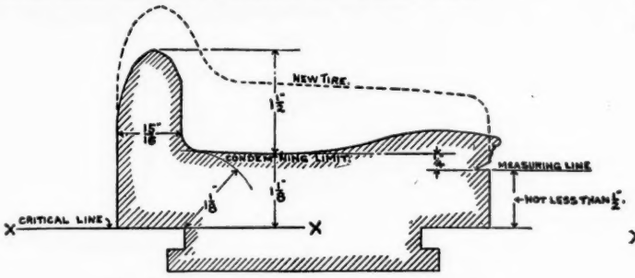
Reference Gage for Mounting and Inspecting Wheels.

have the lip at the end of the gage bearing on the tread when being used."

Mounting New Cast-Iron Wheels; to Provide Proper Clearance When Passing Through Track Frogs and at Guard Rails Having 1¾-Inch Width of Flange Way.

Mechanical difficulties in the manufacture of cast-iron wheels require a variation of $\frac{1}{16}$ inch in thickness, over or under the normal size for flanges, and as this is permitted under M. C. B. rules, it was requested at a joint conference of your committee with the committee representing the American Engineering & Maintenance of Way Association that a similar amount of latitude in reference to track construction be recognized. It was agreed to recommend to the M. C. B. Association that a rule be formulated prohibiting the mounting of two wheels having maximum thick flanges on the same axle; therefore the committee proposes that the M. C. B. Association adopt the following as a standard rule governing interchange of traffic.

RULE 66-A. In no case may two new wheels having maximum thick flanges be mounted on the same axle.



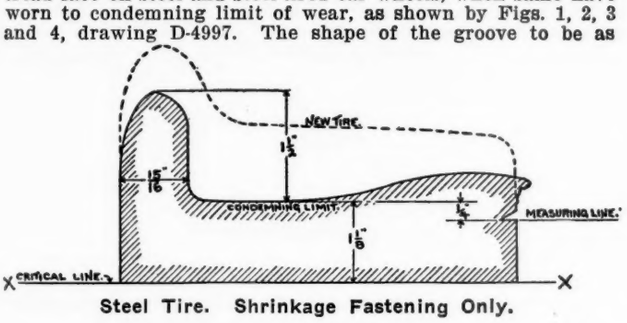
Steel Tire. Retaining Ring Fastening.

Wheel Check Gage, now appearing on page 682 of the 1908 Proceedings in connection with the paragraph covering the "Mounting of Wheels," is incorrect, and the cut now shown should be replaced by cut of Wheel Check Gage taken from Sheet WC-1907-4A presented with this report.

Steel and Steel-Tired Wheels.

The committee has prepared and presents drawing D-4997, covering limits of wear for steel and steel-tired wheels under both passenger and freight cars, and recommends that same be adopted as Recommended Practice governing the service operation of such wheels under both passenger and freight cars, and that the cuts now appearing on M. C. B. Sheet A of Recommended Practice and pages 529 and 530 of the 1908 Proceedings, and 95, 96 and 97 of the Code of Interchange Rules be canceled, and the four cuts reduced from drawing D-4997 substituted therefor.

Location of limit of wear groove to be ¼ inch below the tread face on steel and steel-tired car wheels, when same have worn to condemning limit of wear, as shown by Figs. 1, 2, 3 and 4, drawing D-4997. The shape of the groove to be as



Steel Tire. Shrinkage Fastening Only.

shown on these figures, and measurements to be taken from the horizontal or inside edge of same.

Existing M. C. B. Rules in Code of Interchange and referring to passenger cars require a removal of steel and steel-tired wheels "for worn flanges," when such flanges are greater in section than is prescribed for steel and steel-tired wheels when used under freight cars. Wheel loads under passenger cars will vary from 12,000 to 14,000 lbs. and wheel loads under 80,000 lbs. capacity cars in freight service can, under M. C. B. rules, be increased to 16,000 lbs. and over; therefore the committee propose that rules relating to worn flanges for passenger cars using cast-iron and steel and steel-tired wheels be revised as follows:

RULE 14 (c).

Worn Flanges: Flanges having flat vertical surfaces extending more than ⅞ inch from tread, or flange less than 1 inch thick, gaged at a point ⅜ inch above tread.

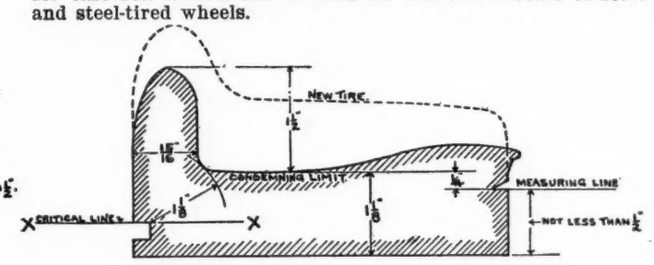
Gage: For condemning worn flanges of cast-iron wheels under passenger cars to be the same as is used for condemning worn flanges of cast-iron wheels under freight cars of 80,000 lbs. capacity or over.

RULE 15 (b).

Worn Flange or Tire: With flange less than $\frac{15}{16}$ inch thick or having flat vertical faces extending more than 1 inch from tread, or, with tire thinner than is shown by Figs. 1, 2, 3 and 4 (drawing D-4997).

Gage: For condemning worn flanges of steel and steel-tired wheels under passenger cars to be the same as is used for condemning worn flanges of steel and steel-tired wheels under freight cars.

The committee proposes and recommends that the Tread and Flange Contour for steel and steel-tired wheels be revised as shown on drawing D-4999, which is exactly similar to the new proposed tread and flange contour included in this report for cast-iron wheels, *from the point of the flange to the outside of the tread only*, and the development of the flange from the "point to the back face of the wheel or tire" has been made of such form that the same mounting and inspecting gages used for cast-iron wheels can be used for the new section of steel and steel-tired wheels.



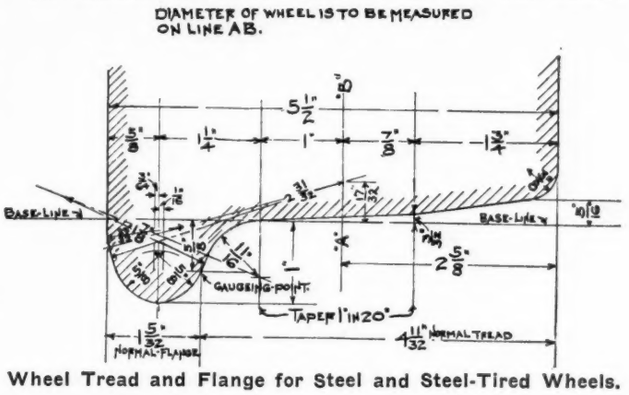
Steel Tire. Retaining Ring Fastening.

In conclusion, the committee's report on sections (b) and (c) of the instructions received from the Executive Committee are as follows:

Section (b). The committee, working jointly with committees representing the Master Mechanics' and Maintenance of Way Associations, have not to date disposed of this, since the discussion at the single joint session was confined solely to the width of flangeway in track through frogs and at guard rails, and another meeting must be held with the representatives of the associations named to finally dispose of the subject.

Section (c). The committee, after working jointly with a committee representing the American Engineering and Maintenance of Way Association, begs to report as follows:

No evidence has yet been presented showing that damage

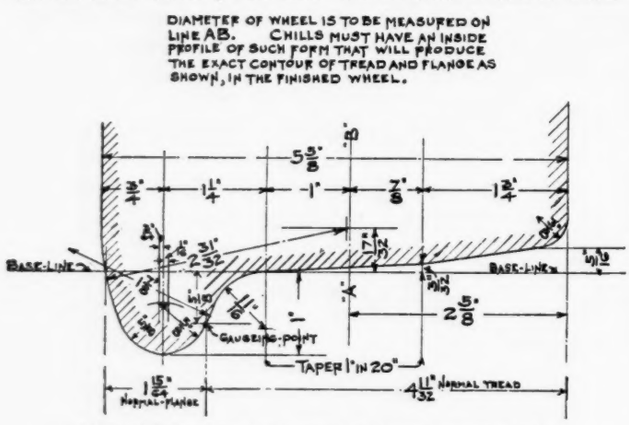


Wheel Tread and Flange for Steel and Steel-Tired Wheels.

to bridges and track can be charged to flat spots on car wheels, whose lengths are within the limits prescribed by present M. C. B. rules, and the committee, therefore, does not feel warranted in recommending to the Executive Committee that any expense be incurred for the procurement of apparatus for making tests.

Explanatory of the points raised regarding said rim taper, the lengthening of the taper by moving the starting point of this taper closer to the flange, also the increase of the slope of the tread at the sand rim, will assist in reducing the number of chipped rims and will materially aid in increasing the mileage of all wheels before the tread becomes worn hollow, since it brings the starting point of the sand rim taper within the zone of rail wear, and the starting point becomes gradually effaced from its original position and moves toward the rim of the wheel or downward on the sand rim taper, thus retarding the formation of a double flanged or worn hollow tread. The points in favor of the reduction of the height of flange for all wheels are two, namely: Flange condemned on account

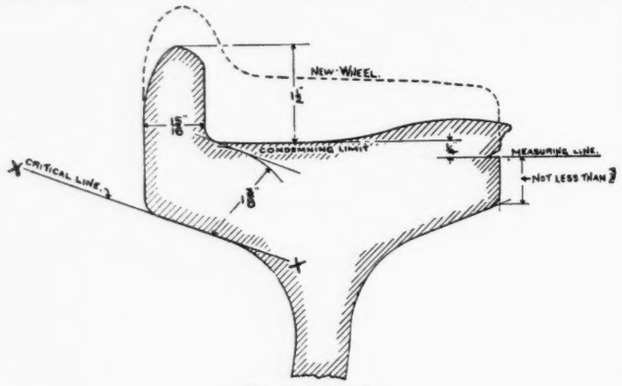
of being worn vertical on wheels having a 1-inch height of flange, will give a greater mileage before reaching this condemning limit on account of the flattening at the point of the flange in the proposed design and by reason of the shorter original height, will be less liable to strike filling blocks in track at crossings, frogs and switches when a wheel having the tread worn comparatively hollow passes over rails which have worn down considerably, and your committee feel that a reduction in the height of the flange can consistently be made when it is shown that the original angle of the flange to resist derailment is in no wise changed. Drawing D-5004 shows, at an enlarged scale, the development of the 1-inch height of flange proposed for cast-iron wheels, also steel and steel-tired wheels recommended in this report, compared with the present standard 1⅛-inch height of flange, and it will be readily seen that the angle of inclination of the flange at the side oppposing the rail is not altered in the slightest degree and that the change is is entirely safe and consistent.


DIAMETER OF WHEEL IS TO BE MEASURED ON LINE AB. CHILLS MUST HAVE AN INSIDE PROFILE OF SUCH FORM THAT WILL PRODUCE THE EXACT CONTOUR OF TREAD AND FLANGE AS SHOWN, IN THE FINISHED WHEEL.
BASE-LINE
GAUGING-POINT
TAPER 1" IN 20"
NORMAL TREAD
NORMAL FLANGE

Wheel Tread and Flange for Cast Iron Wheels.

This drawing also shows the position that would be occupied by an inspecting gage with reference to either cast-iron, steel or steel-tired wheels and emphasizes the fact that the same gages may be used for either as previously mentioned in this report.

Recommendations presented to the Committee on Standards and Recommended Practice at Buffalo on March 20, and referred to the Standing Committee on Car Wheels, contained several suggestions, all of which have been acted upon by this committee, with the exception of the following, which refers



Steel Wheel.

to Reference Gage for Mounting and Inspecting Wheels, and Check Gage, page 636, M. C. B. Sheet 12, and is reported by the Pennsylvania Railroad with the suggestion "That the so-called reference gage for mounting and inspecting wheels be dropped from standard practice and a gage similar to print from tracing No. 3684-B be introduced for mounting of wheels; also a check gage similar to print from tracing No. 3686-A be introduced, which latter gage is at the same time to be used by inspectors in yards and terminals." In the opinion of the committee, the gage shown on Pennsylvania print 3686-A is a modified and improved form of check gage that can be endorsed by the committee for use by all railway companies who care to go to the expense entailed in the first cost of such gage and it feels that the adoption of this form should be left to the individual members, as the points controlled by this gage are exactly similar to those controlled by the present M. C. B. Standard Gage, and the improvement consists in reversible hardened steel bearing points at contact with the gaging point on the flange. The gage shown by Pennsylvania print 3684-B has been arranged to govern the mounting of new wheels, also the remounting of partly worn wheels centrally on one axle, and the design of the gage is such that all axles, whether new or second-hand, must be provided with a center-punch-mark in the middle of the axle, or equi-distant from the center of each journal. It is largely customary in railway and contract shops to mount the first wheel on the axle, gaging from the outside face of the collar, and then mount the mate wheel with the mounting gage to the gaging points. At the solicitation of this committee, the M. C. B. Association several years since cancelled the use of a gage designed for a similar purpose to that now proposed by the Pennsylvania Railroad, and the committee therefore does not feel warranted in recommending a gage of the type proposed by Pennsylvania print 3684-B at this writing, preferring to leave the latter to the action of the convention.

The first, second and third recommendations regarding cast-iron wheels are to govern the construction of all new patterns, chills, etc., for wheels made after the date this report and its recommendations are adopted, and are also to govern the construction of all patterns, chills, etc., that may be classed as renewals, from the same date, it being understood that all existing patterns and chills for wheels conforming to M. C. B. Standards in effect prior to this report may be used by the manufacturers until worn out in the regular course of business, at which time they shall be scrapped and replaced by new equipment conforming to the recommendations set forth herein.

Postlethwaite and Frank Moore and William Gibson—all good Pittsburgers and it is not necessary to specify Postlethwaite by his front name—went for a walk on the boardwalk just for the change. They never have an opportunity to walk on the level in Pittsburgh. Postlethwaite wanted a picture. He had his camera. Picked out a wide place on the walk and ranged Moore and Gibson side by side. Took the picture, or, at any rate, spoiled a film. Came along a single-seated roller-chair with a baby in it, pushed by the baby's mother. Gibson was dared to stand for his photo holding the baby. Gibson is away from home and thought some, but hesitation breeds consent. He consented. To insure consent on the part of the party of the second part, Moore offered his watch. Baby delighted. Leaped into Gibson's arms, sat on his knee, but gazed at the watch. Picture taken. Incident closed, but without consent of one of the high contracting parties—the baby. Would not return to its mother—preferred Gibson. Large inducements offered by Postlethwaite for release of Gibson. Not known at present what consideration passed. Gibson finally released. Moore secured his watch and Postlethwaite moralizes: "Thus early doth the Atlantic City principle of appearing charmed with the guest while abstracting and retaining his valuables take root in the heart of its future citizens."

Again bridge is to the front, and there was a small gathering of its devotees in the music room of the Marlborough-Blenheim yesterday afternoon. Of course, it was a ladies' party, though one born through apparently happy and well-contented man. R. F. Carr was a willing player, having been accepted as a filler to make up the fourth table. The ladies participating were: Mesdames L. B. Firman, T. M. Ramsdell, A. Telford, Geo. L. Fowler, C. A. Hardy, F. D. Lyman, C. E. Fuller, W. H. Miner, C. A. Dunkelberg, Geo. E. Sevey, L. R. Phillips, J. H. Leyonmarck, A. L. Humphrey and John O. F. Enright. The prizes that drew these ladies together were given by Mr. Edward E. Gold, and consisted of a brass jardiniere, a 'lavoliere necklace, a small finger ring, a Sheffield silver jewel box, a Sheffield silver bonbon dish and a piece of Cloissoné ware.

Roland Fraser insists that it is not the Buffalo Baked Bean Company that he is with, although a "break" in the types Tuesday morning suggests the possibility of the ultimate removal of the company to Boston.

SPLICING SILLS.*

The following inquiries were sent out to the members, to which replies have been received as follows:

Q. 1. Are you using the two forms of splices illustrated on pages 26 and 27 of the 1908 Rules of Interchange?

A. Number of roads using splice 9-A only..... 47
Number of roads using splice 9-A and 9-B..... 15

Q. 2. Have you preference for either form, and what are your reasons therefor?

A. Number of roads preferring splice 9-A..... 40
Number of roads preferring splice 9-B..... 19
Number of roads having no preference..... 3

Q. 3. Which form of splice do you find more costly to make, and to what amount?

A. Number of roads reporting increased cost for making splice 9-A..... 19
Number of roads reporting increased cost for making splice 9-B..... 12
Number of roads reporting no difference in cost.. 19
Number of roads giving no figures..... 12

Q. 4. If you have a piece-work price for each style of splice, please submit same.

A. Number of roads reporting piece-work prices..... 26
Number of roads reporting no piece-work prices... 36

Q. 5. Do you find that spliced sills fail more frequently in the splice, or at some other point in the sill?

A. Number of roads reporting more frequent failure in splice..... 7
Number of roads reporting more frequent failure elsewhere..... 42
Number of roads reporting no difference..... 11
Number of roads not replying..... 2

Q. 6. Do you favor the adoption of a standard-size hole for splice bolts?

A. Number of roads answering "Yes"..... 60
Number of roads answering "No"..... 2

The committee submitted to drop tests a number of sills spliced in accordance with each of the two styles permitted by the Rules of Interchange, in order that conclusions might be drawn from average results, and that transverse and tensile tests should be included. It was considered wise to make similar tests upon variations in the standard splice, in the hope that this procedure would throw additional light upon the subject.

The tests were made in the presence of the full committee at the C., B. & Q. laboratory at Aurora, Ill., on October 15, 16 and 17, 1908. The test samples were eight feet in length and were made from select second-hand, sound 5 by 9-inch car sills.

The drop tests were made on M. C. B. drop machine and represent conditions that cause the largest number of failures to sills in service. The method of holding the splice for test is shown on photograph No. 1.

The test was started, using a one-foot drop, and with each succeeding drop raising the distance one foot. Data sheet "A" shows results of these tests.

Comparing results of tests 1 to 4, representing splices per Fig. 9-A; tests 13 to 16, representing splices per Fig. 9-B; and tests 25 to 28, which were made with straight sills without splice, we get the following:

Figure.....	9-A		9-B		Straight sill	
	Test No.	Failed at drop of	Test No.	Failed at drop of	Test No.	Failed at drop of
.....	1	1 ft.	13	3 ft.	25	4 ft.
.....	2	1 "	14	4 "	26	4 "
.....	3	1 "	15	4 "	27	4 "
.....	4	1 "	16	4 "	28	5 "
Average drop	..	1 "	..	3.75 ft.	..	4.25 ft.
Strength,* per cent....	..	23.5	..	88	..	100

*Compared with straight sill.

*Abstract of a report presented at the annual convention of the Master Car Builders' Association. Committee: R. E. Smith (chairman), W. F. Bentley, I. S. Downing, H. L. Trimyer, F. A. Torrey.

SUPPORTS 7 FT. APART FOR TEST OF SPLICES.
SUPPORTS 40 FT. 6 IN. APART FOR TEST OF LINERS

TRANSVERSE TEST OF WOOD SILL SPLICES

SHEET G

TEST NO.	M.C.B. FIGURE	EXCEPTION	SKETCH	KIND OF WOOD IN SILL	KIND OF WOOD IN LINER	DIMENSIONS OF SILL	DIMENSIONS OF LINER	WEIGHT IN LBS.	DEFLECTION AT LOAD OF LBS. 5,000	DEFLECTION AT LOAD OF LBS. 10,000	MAX. LOAD	DESCRIPTION OF FAILURE
5	9A	NONE		YELLOW PINE	YELLOW PINE OAK	$4\frac{13}{16}$" x $8\frac{11}{16}$"	2" x $8\frac{15}{16}$"	141	.40	1.07	14,470	FAILED AT CENTER OF SPLICE
6				YELLOW PINE	YELLOW PINE OAK	$4\frac{13}{16}$" x $8\frac{3}{4}$"	$1\frac{5}{16}$" x $8\frac{15}{16}$"	142	.32	1.04	11,970	POOR LINER
7				FIR	FIR OAK	$4\frac{7}{8}$" x $8\frac{13}{16}$"	$1\frac{5}{16}$" x $9\frac{1}{16}$"	125	.305	.88	13,500	FAILED AT CENTER OF SPLICE
8				YELLOW PINE	YELLOW PINE OAK	5" x $8\frac{7}{8}$"	$2\frac{1}{16}$" x $9\frac{1}{16}$"	143	.24	.70	16,700	FAILED AT CENTER OF SPLICE
17	9B	NONE		YELLOW PINE	YELLOW PINE PINE	$4\frac{15}{16}$" x $8\frac{7}{8}$"	$2\frac{1}{2}$" x 9"	144	.22	.53	17,980	LINER CRACKED AND ONE SECTION FAILED NEAR END OF SPLICE
18				FIR	FIR PINE	$4\frac{3}{4}$" x $8\frac{3}{4}$"	$2\frac{9}{16}$" x 9"	132	.255	.59	17,870	FAILED NEAR END OF SPLICE
19				YELLOW PINE	YELLOW PINE PINE	$4\frac{7}{8}$" x $8\frac{3}{4}$"	$2\frac{1}{2}$" x $9\frac{1}{16}$"	143	.24	.58	14,000	FAILED AT VERTICAL BOLT IN END OF SPLICE
20				YELLOW PINE	YELLOW PINE PINE	$4\frac{15}{16}$" x $8\frac{11}{16}$"	$2\frac{7}{16}$" x 9"	140	.23	.54	14,890	FAILED AT ONE END OF SPLICE
29	STRAIGHT SILL	NONE		YELLOW PINE		$4\frac{15}{16}$" x 9"		68	.15	.33	14,000	BROKE THROUGH SUN CRACK
30				YELLOW PINE		$4\frac{7}{8}$" x $8\frac{7}{8}$"		97	.14	.28	24,480	SPLIT FROM CENTER TO ONE END
31				YELLOW PINE		$4\frac{7}{8}$" x $8\frac{11}{16}$"		93	.12	.24	24,000	FAILED NEAR CENTER
32			8'0"	FIR		$4\frac{27}{32}$" x $8\frac{9}{16}$"		83	.10	.23	24,000	SPLIT FROM CENTER TO ONE END
SEE SHEET B FOR CURVES OF ABOVE TESTS												
39	9A	VERTICAL BOLT ADDED EITHER SIDE 18" FROM CENTER OF SPLICE		YELLOW PINE	YELLOW PINE OAK	$4\frac{7}{8}$" x $8\frac{3}{4}$"	2" x 9"	148	.24	.69	14,130	FAILED AT CENTER OF SPLICE
40				FIR	FIR OAK	$4\frac{13}{16}$" x $8\frac{13}{16}$"	2" x $8\frac{15}{16}$"	122	.345	.97	11,000	FAILED AT CENTER OF SPLICE
45	9A	BOLT OPPOSITE END OF SPLICE LEFT OUT IN EACH END		FIR	FIR OAK	$4\frac{25}{32}$" x $8\frac{7}{8}$"	2" x $8\frac{7}{8}$"	135	.26	.65	14,980	VERTICAL BOLT AT ONE END OF SPLICE BROKE
46				YELLOW PINE	YELLOW PINE OAK	$4\frac{13}{16}$" x $8\frac{11}{16}$"	$1\frac{15}{16}$" x $8\frac{15}{16}$"	125	.31	.77	13,000	ONE SECTION BROKE AT CENTER OF SPLICE
SEE SHEET C FOR CURVES OF ABOVE TESTS												
22	9B	LINER AND OUTSIDE VERTICAL BOLTS REMOVED	REMOVED FOR TEST 22	FIR	FIR	5" x $8\frac{13}{16}$"		89	.57		8,400	FAILED OUTSIDE OF SPLICE
23		LINERS REMOVED		YELLOW PINE	YELLOW PINE	$4\frac{15}{16}$" x $8\frac{7}{8}$"		104	.66		5,900	FAILED IN SPLICE NEAR END
24				FIR	FIR	5" x $8\frac{7}{8}$"		79			4,800	FAILED IN SPLICE NEAR END
53	8	NONE		FIR	FIR	$4\frac{27}{32}$" x $8\frac{3}{4}$"		88	.54		7,600	FAILED AT CENTER OF SPLICE
54				YELLOW PINE	YELLOW PINE	$4\frac{3}{4}$" x $8\frac{11}{16}$"		103	.50		7,900	FAILED AT CENTER OF SPLICE
55				FIR	FIR	$4\frac{7}{8}$" x $8\frac{13}{16}$"		93	.43		9,850	FAILED AT CENTER OF SPLICE
56				YELLOW PINE	YELLOW PINE	$4\frac{7}{8}$" x $8\frac{11}{16}$"		112	.55		6,800	FAILED AT CENTER OF SPLICE
65	8	BUTT SPLICE		FIR	FIR	$4\frac{13}{16}$" x $8\frac{11}{16}$"		99	.78		5,900	FAILED NEAR END OF SPLICE
66				YELLOW PINE	YELLOW PINE	$4\frac{13}{16}$" x $8\frac{3}{4}$"		106	.56		9,000	FAILED NEAR END OF SPLICE
67				FIR	FIR	$4\frac{13}{16}$" x $8\frac{13}{16}$"		80	.66		6,870	FAILED NEAR END OF SPLICE
68				YELLOW PINE	YELLOW PINE	$4\frac{15}{16}$" x $8\frac{13}{16}$"		115	.50	1.98	10,000	FAILED NEAR END OF SPLICE
SEE SHEET D FOR CURVES OF ABOVE TESTS												
	3 OAK LINERS		SEE CURVE SHEET			$5\frac{7}{8}$" x 9"		114	.03	.07	50,250	SPLIT AT BOTH ENDS
	3 PINE LINERS					$7\frac{1}{16}$" x 9"		102	.03	.06	42,950	SPLIT AT BOTH ENDS
SEE SHEET E FOR CURVES OF ABOVE TESTS												

This shows that the splice made as per Fig. 9-B will stand 88 per cent. of the abuse that solid sills will stand, while the splice made as per Fig. 9-A will stand only 23.5 per cent. of the abuse that the solid sill will stand.

The weak place in the splice Fig. 9-A is the small cross-section at the ends; with splice Fig. 9-B we get practically the solid timber to withstand the blows which occur in the bumping of cars.

The curve sheet "B" shows comparative transverse strength on splices Fig. 9-A, Fig. 9-B, and straight sills. These tests were made with supports seven feet apart. The splices made and three pine liners bolted together. Supports were 4 feet 6 inches apart. The pine liners are the stiffest, while the oak liners stood the largest load.

Curve sheet "F" shows results of tensile tests made on one each of splice Fig. 9-A, Fig. 9-B, Fig. 8, and Fig. 8 except the butt splice was used instead of the standard.

These tests show in favor of the splice made as per Fig. 9-B.

There is very little, if any, strength added to the butting resistance of splice 9-A by the side plank and that this form of splice is not appreciably improved by the addition of the vertical bolts 18 inches each side of the center of the splice,

TEST of WOOD SILL SPLICES SHEET A

TEST NO	M.C.B. FIGURE	EXCEPTION	SKETCH	KIND OF WOOD IN SILL: TOP	KIND OF WOOD IN SILL: BOTTOM	KIND OF WOOD IN SILL: LINER	DIMENSIONS OF: SILL	DIMENSIONS OF: LINER	WEIGHT IN LBS	DROP IN FEET — ONE BLOW FOR EACH HEIGHT: 1	2	3	4	5	6
1	9A	NONE	8.0	YELLOW PINE	FIR	OAK	4⅞" x 8⅜"	1 15/16" x 8⅜"	145	SPLIT AT BOTH BUTTS.					
2				YELLOW PINE	YELLOW PINE	OAK	4 13/16 x 8 13/16"	1 15/16" x 8⅜"	151	BOTH BUTTS SPLIT FOR SHORT DISTANCE.	BOTH BUTTS CRUSHED AND SPLIT TO ENDS OF TIMBER.				
3				YELLOW PINE	YELLOW PINE	OAK	4⅞" x 8 13/16"	1 15/16" x 9⅛"	160	SPLIT AT BOTH BUTTS. BOTTOM TIMBER DEFECTIVE.					
4				FIR	FIR	OAK	4⅞" x 8½"	1 15/16" x 9"	134	SPLIT AT BOTH BUTTS					
13	9B	NONE	8.0	YELLOW PINE	NORWAY PINE	PINE	4⅞" x 8⅜"	2½" x 9"	123	OLD CRACK AT TOP BUTT EXTENDED 18 INCHES	NO CHANGE	CRUSHED BETWEEN 2ND AND 3RD VERTICAL BOLTS ON SIDE. SPLIT IN TOP SECTION	CRUSHED IN THREE PIECES SPLIT IN TOP AND BOTTOM SECTIONS.		
14				YELLOW PINE	YELLOW PINE	PINE	4⅞" x 8 11/16"	2½" x 8 15/16"	146	O.K	O.K	O.K	SPLIT ALONG KEY WAY AND THROUGH VERTICAL BOLT SPLIT BETWEEN TWO CENTER VERTICAL BOLTS.	SHATTERED. BADLY BETWEEN BUTTS	
15				FIR	FIR	PINE	4 15/16" x 8⅜"	2½" x 9"	124	SLIGHT SPLIT IN SPLICE NEAR UPPER BUTT	NO CHANGE	NO CHANGE	SPLIT IN TOP SECTION NEAR BUTT EXTENDED TO END OF TIMBER.	TOP SECTION BADLY SPLIT. PUSHED UP BOTT. IN SPLICE	
16				YELLOW PINE	FIR	PINE	4⅞" x 8⅜"	2 7/16" x 9"	152	O.K	O.K	O.K.	SLIGHT CRACK IN LOWER SECTION AT BUTT.	CRUSHED ON ONE SIDE TOP AND BOTTOM	
25	STRAIGHT SILL WITHOUT SPLICE	NONE	8.0	YELLOW PINE			4 11/16" x 8 13/16"		116	O.K	O.K	O.K	SLIGHT SPLIT AT TOP ON SIDE. SPLIT UP ½ AT TOP FROM BOTTOM	SPLIT ENTIRE LENGTH.	
26				YELLOW PINE			5¼" x 8⅜"		110	O.K	O.K	O.K	CRUSHED SLIGHTLY AT TOP.	CRUSHED AND SHATTERED AT TOP.	
27				FIR			4⅞" x 8⅜"		84	O.K	O.K	O.K.	BADLY CRUSHED AND SPLIT AT BOTTOM		
28				FIR			4 11/16" x 8½"		87	O.K	O.K	O.K	O.K	SHATTERED AT BOTTOM	
37	9A	VERTICAL BOLT RODDED EITHER SIDE 18" FROM CENTER OF SPLICE		YELLOW PINE	YELLOW PINE	OAK	4 11/16" x 8⅜"	1⅞" x 8⅞"	141	SPLIT AT BOTH BUTTS	BADLY CRUSHED AT BOTH BUTTS				
38				YELLOW PINE	YELLOW PINE	OAK	4⅞" x 8½"	1 15/16" x 9"	148	SLIGHT CRACK AT BOTH BUTTS	BADLY CRUSHED AND SPLIT AT BOTH BUTTS				
43	9A	BOLT OPPOSITE END OF SPLICE LEFT OUT IN EACH END.		FIR	FIR	OAK	4⅞" x 8⅜"	2" x 9"	130	SPLIT FROM BOTH BUTTS TO ENDS OF TIMBER					
44				YELLOW PINE	YELLOW PINE	OAK	4⅞" x 8⅜"	2" x 8 15/16"	137	SPLIT AT LOWER BUTT	CRUSHED IN SPLICE AND BADLY SPLIT AT LOWER BUTT				
49	8	NONE	8.0	NORWAY PINE	NORWAY PINE		4⅞" x 8 11/16"		73	SPLIT AT UPPER BUTT, SPLIT AND CRUSHED AT LOWER BUTT	BADLY CRUSHED AT BOTH BUTTS.				
50				YELLOW PINE	YELLOW PINE		4 13/16" x 8⅜"		108	SPLIT AT BOTH BUTTS	BADLY CRUSHED AT BOTH BUTTS.				
51				YELLOW PINE	YELLOW PINE		4¾" x 8⅜"		98	SPLIT FROM BOTH BUTTS TO ENDS OF TIMBER.	CRUSHED IN LOWER SECTION AWAY FROM BUTT				
52				FIR	FIR		4⅞" x 8½"		84	SPLIT FROM BOTH BUTTS TO ENDS OF TIMBER.					
61	8	BUTT SPLICE	8.0	YELLOW PINE	YELLOW PINE		4 11/16" x 8½"		101	O.K	O.K	O.K	LOWER SECTION BADLY SPLIT. UPPER SECTION SPLIT THROUGH BOLTS IN SPLICE		
62				YELLOW PINE	YELLOW PINE		4 15/16" x 8⅜"		95	O.K	SPLIT IN LOWER SECTION DUE TO DEFECTIVE TIMBER				
63				YELLOW PINE	YELLOW PINE		4 15/16" x 8 11/16"		117	O.K	O.K	SHEARED AT ONE CORNER OF LOWER SECTION ENTIRE LENGTH.	SPLIT THROUGH VERTICAL BOLTS AND AT LOWER BUTT THROUGH OLD CRACK		
64				YELLOW PINE	YELLOW PINE		4⅞" x 8 13/16"		112	O.K	O.K	O.K	O.K	O.K	UPPER SECTION SPLIT THROUGH VERTICAL BOLTS. UPPER BUTT CRUSHED
73	9A	LOCATION OF BOLTS CHANGED	8.0	YELLOW PINE	FIR	OAK	4 13/16" x 8⅜"	1 15/16" x 9"	134	SPLIT AT BOTH BUTTS	LOWER BUTT BADLY SPLIT				
74				YELLOW PINE	YELLOW PINE	OAK	4 15/16" x 8 11/16"	2" x 9"	143	O.K	SHATTERED FROM BOTH BUTT TO ENDS OF TIMBER				
75				FIR	YELLOW PINE	OAK	4⅞" x 8⅜"	1 15/16" x 9"	124	SLIGHTLY SPLIT AT BOTH BUTTS.	CRACKS EXTENDED AND BOTH BUTTS CRUSHED	BADLY CRUSHED AT BOTH BUTTS.			
76				YELLOW PINE	NORWAY PINE	OAK	4 15/16" x 8 11/16"	1 15/16" x 9"	150	SLIGHTLY SPLIT AT BOTH BUTTS.	CRACKS EXTENDED TO SHATTERED AT ONE SIDE IN LOWER SECTION.				
77				FIR	FIR	OAK	4 15/16" x 9"	2" x 9"	121	SLIGHTLY SPLIT AT BOTH BUTTS.	BADLY SPLIT AND CRUSHED AT BOTH BUTTS.				
78				FIR	FIR	OAK	5 1/8" x 8 13/16"	1 15/16" x 9½"	124	SLIGHTLY SPLIT AT UPPER BUTT.	CRACK EXTENDED AT UPPER BUTT. BOTH BUTTS SLIGHTLY CRUSHED	BOTH BUTTS CRUSHED UPPER BUTT BADLY CRUSHED			

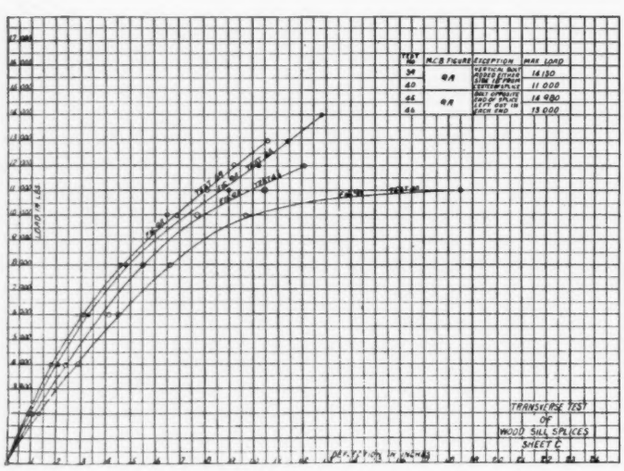
to Fig. 9-A give the largest deflections, while the straight sill gives the least deflections.

Tests shown on curve sheet "C" and the tests 22, 23 and 24 on sheet "D" show tests on sills with some exceptions to the standard splices. In test 22, with lines and vertical bolts outside the splice removed, the maximum load was 8,400 pounds. and failure occurred at a section outside splice. On tests 23 and 24, with liners only removed, the maximum loads were 5,900 and 4,800 pounds, respectively. Failure occurred in upper section and within the splice.

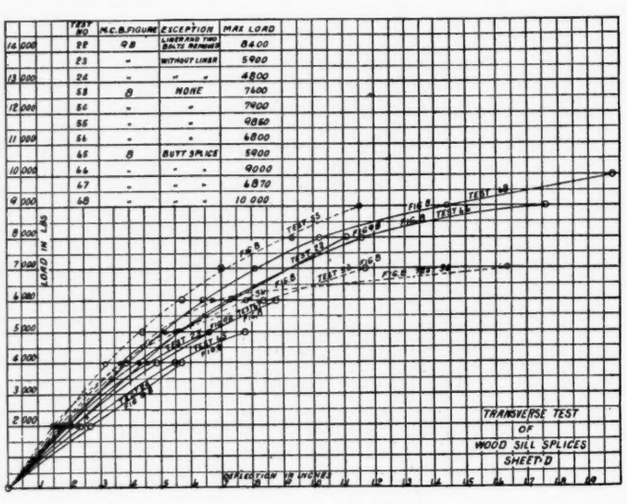
Curve sheet "E" shows transverse test on three oak liners nor by the omission of one of the horizontal bolts near each butt of the splice.

In fact, all forms of the scarfed splice failed under very much less severe butting strains than the square butt splice; the weakness of this splice is due, in the judgment of the committee, to the fact that pressure or a blow upon the end of the sill causes the inclined surface of the scarf to slide sufficiently upon each other to interlock the fibers of the sills at the shoulders.

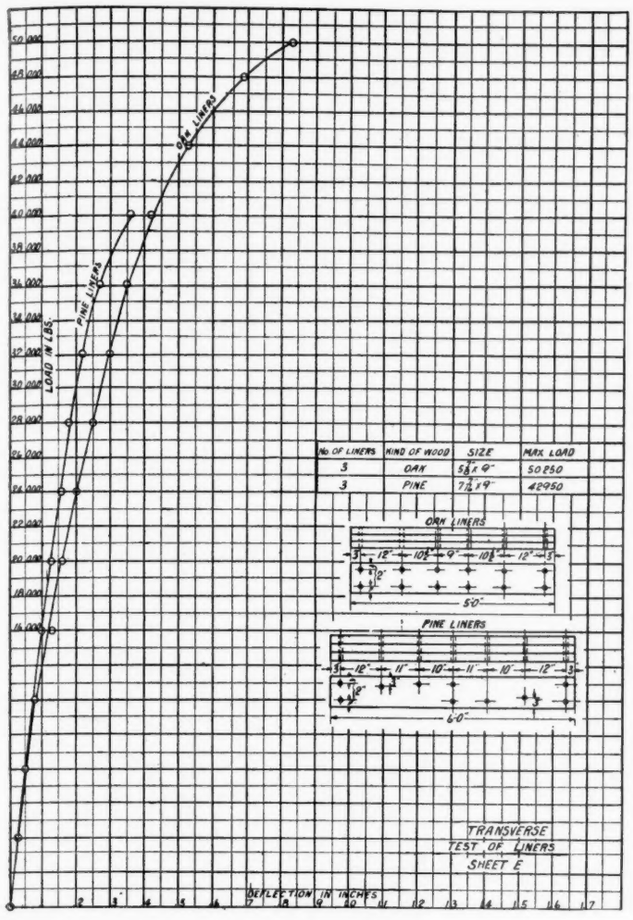
As it is not usual, if not impracticable, under the conditions under which splicing of freight-car sills is usually done, to



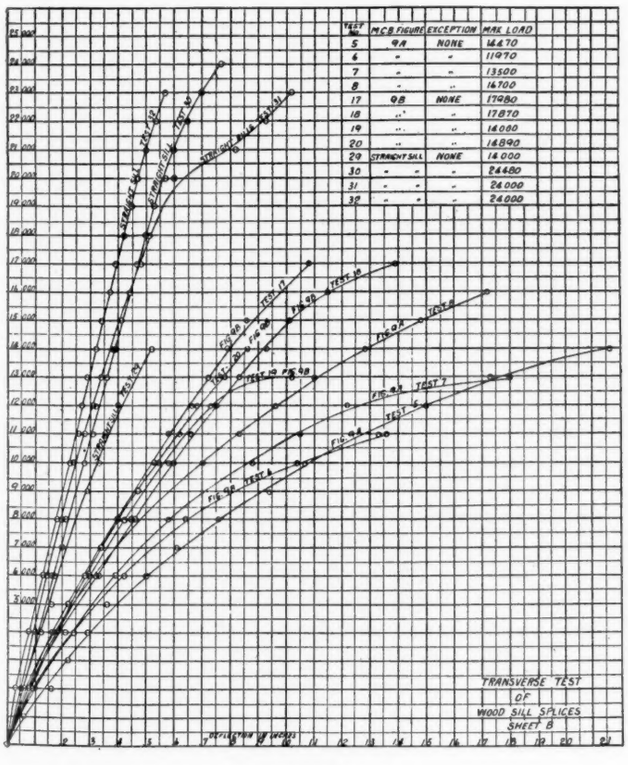
Sheet C.



Sheet D.


OAK LINERS
PINE LINERS
LOAD IN LBS.
DEFLECTION IN INCHES
No OF LINERS | KIND OF WOOD | SIZE | MAX LOAD
3 | OAK | 5⅛ x 9" | 50250
3 | PINE | 7½ x 9" | 42950
OAK LINERS
PINE LINERS
50"
60"
TRANSVERSE TEST OF LINERS SHEET E

Sheet E.


TEST No | M.C.B FIGURE | EXCEPTION | MAX LOAD
5 | 9A | NONE | 14470
6 | " | " | 11970
7 | " | " | 13500
8 | " | " | 14700
17 | 9B | NONE | 17980
18 | " | " | 17870
19 | " | " | 14000
20 | " | " | 16890
29 | STRAIGHT SILL | NONE | 14000
30 | - - | - | 24680
31 | - - | - | 24000
32 | - - | - | 24000
TRANSVERSE TEST OF WOOD SILL SPLICES SHEET B

Sheet B.

fit them up without a certain amount of slack in the bolt holes and at the shoulders, the movement described above probably takes place under comparative light butting shocks, and it could not be altogether prevented by the use of tightly fitting bolts and superior workmanship, on account of the compression of the timber around the bolts and the small areas of the shoulders.

As the movement is continued, the two members of the splice tend to slide up, over and past each other, tearing loose by a lifting movement the upper portion of the sill, which splits along the grain, starting invariably at the base of the shoulders. Any further movement results in buckling the detached portion or in shattering it.

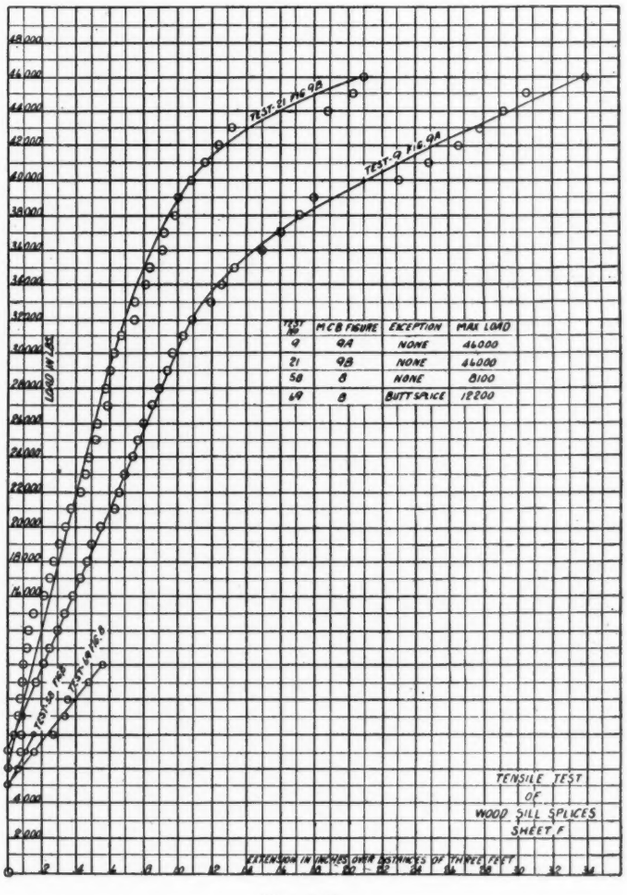
It is clear that the weakest form of splice would be that with a plain scarf, without shoulders; a similar splice with shoulders of small area would be stronger than the plain splice under butting or compressive strains; with shoulders of still larger area, the splice would be still stronger, and so on until a form of splicing, having shoulders of combined area equal to the full cross section of the sill, is evolved; splice 9-B is such a splice. This form of splice, then, logically, is the strongest, and under the drop tests, conducted by your committee, it was proven to be.

The transverse tests of the side planks, considered in connection with similar test of the splices without the reinforcing side planks, show the large part the former play in stiffening both forms of splices, 9-A and 9-B.

When subjected to tensile strains, the behavior of both forms of splice was practically uniform under such strains as are probably developed in actual service; whatever difference there appears to be in the strength of the two samples (9 and 21) is probably accidental and due to workmanship, difference in compression around bolts, friction between parts, and not to any difference in form.

The butt splice has a further advantage over the scarf splice, arising out of the greater ease with which it can be framed without removing the sound portion of the sill from the car, and some lines, for this reason, allow a lower piecework price for the butt than for the scarf splice.

It is believed that as great skill is not required to frame the butt as the scarfed splice, and that, therefore, this class of


TEST No | M.C.B FIGURE | EXCEPTION | MAX LOAD
9 | 9A | NONE | 46000
21 | 9B | NONE | 46000
58 | B | NONE | 8100
69 | B | BUTT SPLICE | 12200
LOAD IN LBS.
EXTENSION IN INCHES OVER GAUGE OF THREE FEET
TENSILE TEST OF WOOD SILL SPLICES SHEET F

Sheet F.

work can be done at such points and under such conditions as would not admit of the use of the scarfed splice.

The committee recommends, for work to be done after September 1, 1909:

1. That splice 9-B be adopted as standard for the splicing of center or draft sills of freight cars.

2. That five-eighths of an inch in diameter for bolts and eleven-sixteenths of an inch for bolt holes be adopted as standard in assembling sill splices of freight cars.

3. That the butt, or step splice, without side plank, be adopted as standard for the splicing of all freight car sills, other than center or draft sills.

SUBJECTS.*

The committee has gone over the various subjects presented by the railways of the country, and recommends that the subjects for committee work for the 1910 convention and for topical discussion during the noon hour of the 1909 convention be limited to the following, the reason being solely to give more time for free and thorough discussion of the subjects presented:

For Committee Work.

1. Steel hopper and drop-bottom gondola cars—clearance for third-rail construction, and design of the door itself to enable it to be kept tight when handling heavy commodities, such as ore, etc., and under the rough usage incident to the loading of billets, pig iron, and other heavy commodities loaded from a considerable height.

2. Construction of car roofs, end bracing of box car superstructure, and bracing for side doors.

3. Maximum height of flange of wheels in service to prevent damage to track without danger to the wheels.

4. Springs for freight car trucks—revision of specifications, covering design, material and requirements as to heat treatment.

5. Damage to cars by car-dumpers and the remedy.

For Topical Discussion at Noon Hour.

1. Wheel defects—is a brake burn due to prolonged brake application properly an owner's defect? How is it to be distinguished from the defect known as shelled out?

To be opened by H. D. Taylor.

2. Application of suitable lugs to steel or steel-underframe cars for jacking-up car bodies, and application of suitable push-pole pockets to avoid damage to cars.

To be opened by Thomas Paxton.

3. Wheel mounting pressures for various sizes of cast-iron and steel wheels.

To be opened by W. T. Gorrell.

4. Cleaning of triple valves and brake cylinders on freight cars to meet Interstate Commerce Commission requirements.

The committee, in restricting the list of subjects for both committee work and topical discussion, is not unmindful of the fact that before the convention other subjects of immediate importance may develop, and room is thus given for the inclusion of such subjects. The committee is also aware that some of the subjects here presented for topical discussion may, as a result of such discussion, be desirable for committee action during the coming year, and it would reiterate the importance of limiting the number of subjects so as to secure better opportunity for discussion.

The committee would recommend that the following subjects be referred to the regular committees having such work in charge:

Breakage of bottom arch bars, to Committee on Freight-car trucks.

Side-bearing clearance and location, to Committee on Side Bearings.

Leverage for hand brakes, to Committee on Train Brake and Signal Equipment.

Strengthening of air hose with some covering or otherwise so as to lessen the wrecks caused by burst hose, to Committee on Air-brake Hose, with definite instructions to investigate and report.

Post got extremely weary at the Railway Supply Manufacturers' Association meeting on Saturday, because of the frequent references to him as the "silver-tongued" orator. Finally he stuck out his tongue to Wakeman and asked: "Anything the matter with my tongue? Is it silver?" "No," replied Wakeman, "they've got the wrong term. It's only plated."

*Report presented at the annual convention of the Master Car Builders' Association. Committee: H. D. Taylor (chairman), A. W. Gibbs, J. S. Lentz.

MASTER CAR BUILDERS' ASSOCIATION.

Proceedings of the Third Session of the Forty-third Annual Convention.

President McKenna called the meeting to order at 9:15 o'clock.

The first report was that on Freight Car Trucks. The Secretary presented the report.

Discussion on Freight Car Trucks.

There was no discussion of this report. The recommendations of the committee were ordered referred to letter ballot for adoption as recommended practice.

The next report, on Painting Steel Cars, was then presented by Mr. Carson.

Discussion on Painting Steel Cars.

C. A. Seley (C., R. I. & P.)—I would like to ask the committee what the types of the cars were that are described here and what class of service they were in.

Mr. Carson—All steel cars, hoppers and gondolas, in ordinary service, limestone trade or coal. It will be quite instructive, I think, to examine these scrapings from the sides of these cars that have been in service 15 months.

R. P. C. Sanderson (Virginian)—I would like to ask if the painting was done on new cars when built or on older cars scraped and repainted.

Mr. Carson—There are cars that have been in service probably two to three years; they were sand-blasted, removing all the old paint and any rust or scales.

J. R. Onderdonk (B. & O.)—I would like to ask for the outside coating, where the different oils were used, how the lettering was applied.

Mr. Carson—The coating was applied after the lettering.

C. E. Fuller (Union Pacific)—I would like to ask whether or not the committee gaged the thickness of the sheets to find out what the deterioration was in thickness, by sandblast, on the inside.

Mr. Carson—There was no gage. The first thing we did was to go into the outside coat. Our main object was to paint on there under ordinary service. I believe the preservation of the inside of steel cars is pretty nearly hopeless. I do not see how you are going to get at it. One of the best things for the inside of steel cars is to keep them in active service. I have in mind steel cars that have been in service ten years, that are constantly busy, and the plates to-day are in excellent shape; they are good for 10 or 11 more years, but deterioration takes place very rapidly when the car is standing. One month's time idle is equal to two or three years in service, so far as deterioration is concerned.

Mr. Fuller—I think this committee omitted the most important part of its investigation. What we want to know is the life of a steel car, and I feel that they should have gaged the different cars, getting the thickness of the metal by scraping the paint off and then gaging it after their sandblast. Some years ago I went into this matter very carefully, gaging cars every six months. We found it reduced the life of the car to continually clean the inside of it. Every time you remove the rust you increase the rapidity of deterioration. That is a very peculiar statement to make, that the knocking off of the rust from the inside of a steel car will increase the rapidity of its depreciation, in proportion to the number of times you knock it off, but that is a fact; and, as the chairman said, six months idle is more destructive than five years in constant service. I believe that if we get a preservative that will take care of the outside of the cars and leave the inside alone the constant friction of the coal dumping and emptying will take care of the inside sufficiently well to meet all requirements. If you attempt to scrape or sandblast the inside of the car, taking off the scale that is fairly sound and leaving the new metal constantly exposed, I venture to say you will cut the life of steel cars down one-third, if not one-half.

Mr. Carson—I want to agree with what Mr. Fuller says with reference to removing the rust on the inside of steel cars. I do not believe that any corrosion on the inside of steel cars, and especially around the rivets, should be removed. I have removed corrosion from the inside of steel cars that had been in service for six or seven years, and under the corrosion, especially around the rivet heads, everything was in perfect shape.

A. W. Gibbs (Penn.)—I ask the committee whether it has been in touch with the American Society for Testing Materials. There is a committee from the paint makers' association which is carrying on extensive tests on the results of cleaning the different pigments. I believe they have some hundred samples of painted surfaces exposed at Atlantic City here. They have been here for a year or more and it has developed that certain pigments distinctly hurry up the corrosion and some others

retard it. It is probable at the meeting next week there will be a lot of additional and very valuable information obtained. I suggest that this committee, if it has not already taken steps, should get in touch with the American Society for Testing Materials, so that they can take advantage of the work of that society in next year's report.

The President—Are you in touch with that committee, Mr. Carson, in connection with the work of your committee?

Mr. Carson—No.

F. W. Brazier (N. Y. Cent.)—I move that the report of the committee be accepted and the recommendations adopted and that the committee be continued for another year to make further tests, taking up the points which Mr. Gibbs speaks of.

John Tonge (M. & St. L.)—Was the painting of the iron cars done in a closed room where the paint is not put on the iron while it is cold? It was my early experience that tar applied to iron that is cold will not give satisfactory results, but if it is applied when the iron is warm, so that there is sufficient heat to set it, and the iron is clean, you can depend on it staying there indefinitely. I do not think it is advisable to paint steel cars outdoors in cold weather.

Mr. Carson—The committee does not recommend outside painting, but in this case it was all outside painting in favorable weather, not cold, just moderate. The majority of the railway companies are doing their painting outside, and we took the general conditions which were existing as the conditions under which we would make the test.

Mr. Sanderson—There is more fake business in connection with the painting of steel cars than anything else with which I have anything to do. On one occasion a gentleman of some standing came into our office and wanted to sell a protective coating; he claimed that the basis of the pigment were the oxides of carbon. Some of you, gentlemen, may know what that means. We told him we did not care to fool with paints made of such fugitive materials.

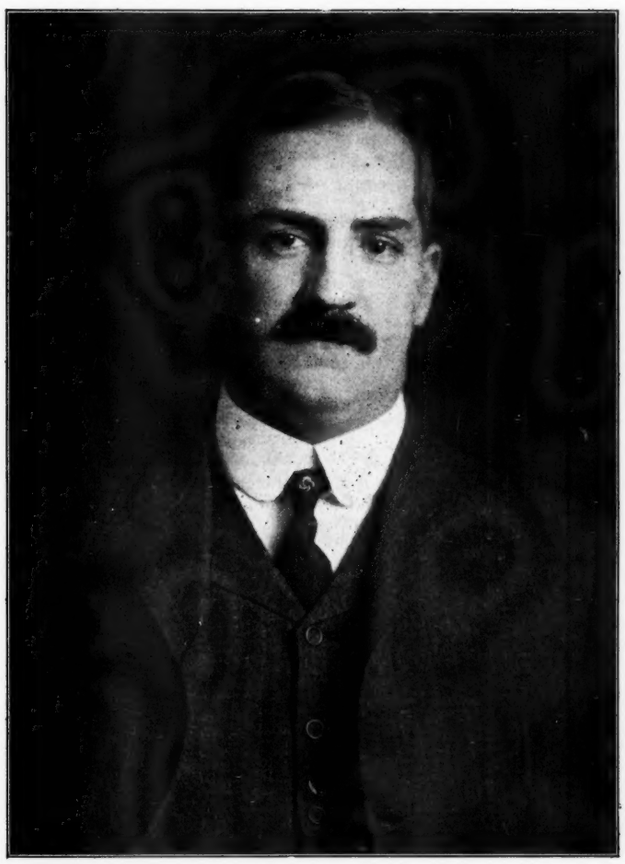
I would like to settle what Mr. Gibbs said in connection with the work which is being done by the American Society for Testing Materials. Dr. Cushman, in Washington, among others, is working with them, and they have developed some very curious things in regard to the action of certain pigments, not only that some of them hurry up the corrosion, but that others have a distinctly inhibitive character and delay corrosion. I am making some experiments for our company along the same lines, by exposure tests, but they are not going to be as complete or instructive as those being made under the auspices of the Society for Testing Materials, under more expert supervision. I urge the committee to go into that thing thoroughly before they make the final report, and let us cut out the oxides of carbon paints.

Mr. Seley—The remarks of Mr. Sanderson, I think, could be amplified in regard to the character of the pigments. There are pigments used that are inhibitive, as he says, and there are other pigments which are stimulative. There are also pigments which are between the two, inert.

I listened to a paper on that subject at a meeting of the Western Society of American Engineers, and I believe that that phase of the question is being taken up by the Society for Testing Materials. It appears that if our committee could get in close touch with all these sources of information, there is no doubt but that by next year we could have a first-class formula for this steel car painting.

The recommendations of the committee were accepted and the committee ordered continued.

The next report was that on Box-Car Doors and Fixtures. Mr. Morse presented the report.



F. H. CLARK,
Incoming President, Master Car Builders' Association.

Discussion on Box Car Doors.

R. L. Kleine (Penna.)—The number and spacing of bottom door guides shown on plate No. 1 of the report will be satisfactory, providing the open door stops are changed to show lips engaging the door in the open position; otherwise an additional bottom door guide should be added to secure the door in the open position.

No provision is made for covering the joint between the sections of grain doors shown on plate No. 2. It is possible that grain will leak out between the sections forming the complete grain door, and I feel the joint strip should be added, which will require a change in the construction of the section of grain door submitted.

Mr. Morse—There are two door guide brackets, which engage the door at every possible position from the entirely shut to the entirely open. The open door stops are not provided with lips for the reason that we consider the brackets sufficient for that purpose, and that the lips would only be of use when the door was entirely open. The door has been stiffened up by means of this single iron at the top and the Z-bar at the bottom, so that there would not be much danger of warping. I believe with a bracket in the center of the door and one at the front corner, that when the door is in the open position, lips on the open door stops are not necessary.

As regards the joint between the temporary doors, the committee considered that quite carefully, but was not able to arrive at any satisfactory solution, except that the door should be made with straight edges, and I believe the specifications call for that. The doors manufactured have a rough edge, and I presume the man applying the door will put a strip over it if necessary.

Mr. Kleine—By referring to Plate No. 1, it will be seen that between the back bracket, when the door is in an open position, you have about 3 ft. 6 in. where no protection is afforded to the bottom of the door from swinging out, and for that reason, in the complete open position, I believe the open door stop should be provided with a lip. We have had considerable complaint from grain shippers in Chicago on account of leakage of grain, and I am just a little bit afraid that the grain door without a joint strip between the different sections is going to get us into trouble with grain leaking between those sections, especially if the lumber is warped slightly.

D. F. Crawford (Penn.)—This subject of box car doors and fixtures seems to be growing in importance. We have had on the Pennsylvania lines several accidents, which were fortunately slight, caused by loose doors. In view of the possibility of accidents and injury to persons, I believe the committee should take all precautions and add lips on the open door stops and additional brackets, rather than run this risk. I do not think we should be content with two door stops, as shown, for the open position, when one is entirely out at the edge of the door. It really means that there is one effective door stop holding the door when it is in the open position. I know we have instructions to close the doors, but instructions are not always carried out. If it is possible, or parliamentary, I would like to move that we put an additional bottom door bracket on this door.

Mr. Seley—I do not see why any railway cannot put a whole line of brackets on there if it wants to. I believe that the report of the committee is in accordance with usual and customary practice, and I would commend the design as shown in the plate.

As regards fhe temporary grain door, I believe that this is also the usual and customary practice. It is a difficult matter to arrange for a lap and have it a complete lap for a bottom section of the floor without losing strength.

Mr. Crawford—It is the usual and customary practice that is getting us into trouble. That is why I would like to see it changed. I appreciate that we can put as many door stops on our cars as we want to, but we move the cars of the other railway companies over our lines.

W. E. Fowler (Canadian Pacific)—I am surprised at not hearing more from the western men in regard to this grain door proposition. It is getting to be a very serious one. The company I am with now spend, I think, about $90,000 a year on temporary grain doors, and I would be sorry to see this grain door that is recommended here go into Recommended Practice, or as Standard, because I agree that there is a strong possibility of leakage of grain out through these open joints. The door might have been improved a great deal if this material had been specified to be tongued and grooved. I do not think the proper grain door will be made or applied until we arrange for some protection for the company that puts the grain door on the car. It is about universally conceded that no temporary grain door fills the bill, and it is also pretty geenrally understood that when a car which has been carrying grain and may have one or two grain doors left in it gets out into the prairie sections, where the grain is loaded in bulk into the car, the farmer is very much attracted by the appearance of the grain door, and it goes home with him. I think we will either have to give protection to the owner of the car or exclude this from owner's responsibility, or go to metal grain doors. There have been a great many metal grain doors, in more or less complicated form, offered ta us for some time past, but I do not think there is any necessity for any of these complicated things. We have been experimenting for some time and have found that a simple sheet metal door stiffened up with angles or Ts meets all the requirements. Such a door would be everlasting when it was once installed in the car. We would cut out all this annual expense if we only had something permanent. But, on the other hand, the railway company is not going to put as much money into grain doors as is necessary for this steel door unless there is some protection for the company.

Mr. Sanderson—There is a point that Mr. Fowler has not mentioned, and I do not blame him. There are large numbers of box cars in this country built for and owned by railway companies which do not handle bulk grain. A temporary grain door of this character is going to be a necessity for the loading of cars when it gets into western territory. Of course the western railway is building such cars for such purposes, but the road that builds cars for handling fruits, vegetables, etc., is not supposed to put in steel grain doors for the benefit of the man out West, when the car goes out there. If you adopt a steel grain door as standard, you are not going to put anything of that kind in the ordinary box car. Something else would be necessary there, wouldn't it?

Mr. Fowler—Evidently Mr. Sanderson is talking from the standpoint of the Atlantic coast man. I am talking from the standpoint of the western man, in whose territory the grain originates, where there is lots of it carried, and I think I would be correct in saying to him that the number of cars which are temporarily grain cars is very much smaller than the number of cars which are regularly, during the shipping season, engaged in grain carrying. And there is another thing—our standard door opening is 6 ft. I never saw a temporary grain door yet that wouldn't bulge very badly under the pressure of bulk grain behind it, and I think that a temporary grain door with a 6-ft. opening—and, as, in some cases, we have gone to 7-ft. openings—is a delusion. It is ineffective. We have come to steel cars, and we have got to come to steel grain doors some time.

M. K. Barnum (C., B. & Q.)—I would like to say that the road I am associated with is spending $200,000 a year on grain doors. We have had a committee for the last two years, appointed to investigate the subject and report at our annual meeting, and up to this time we have not found any permanent door that seemed to be satisfactory. We have concluded, though, that a permanent door, in order to be satisfactory, must be made of steel, for the reason that the men at the elevators that open the temporary doors ordinarily, open them with a crowbar or an ax, and any wooden permanent door, so-called, is almost sure to be partially destroyed every time it is opened at an elevator. Of course, we also have reports which show that in the Chicago elevators a number of so-called permanent doors are usually in more or less bad order. For that reason our company has, up to this time, continued to use the temporary door, but we make what we consider a better door than that used by many of our connecting roads. We use a double door and have comparatively little trouble with its breaking under load or bulging, as must occur in a 6-ft. opening with a single door, made of the class of material ordinarily used for grain doors. We found, further, in investigating this subject, that while the Burlington is a grain-carrying road, our 25,000 box-cars only averaged about eight carloads of grain per year, or, I may say, grain or other commodities which would require something in the form of a grain door to retain them. So that for the other lading during the year, aside from the eight carloads, we would be carrying around a door, with the additional weight and the cost of maintenance, and have no use for it; so that that is an argument which perhaps has not been altogether considered by many who have thought somewhat on the question. I believe if a movement could be started for using a better temporary door, that condition that one of the members mentioned, that they were very unsatisfactory, would be remedied after some experience. Our experience with a good temporary door is that it is pretty hard to beat, because it can be used with either side opening or the end opening, and, as some of the gentlemen have said, it makes a good pig pen. But, we have overcome a good deal of that trouble by additional supervision at the elevators and at our stations along the line, and we have now on two divisions a plan on trial for checking out to the agent the doors delivered to him and requiring him to make a monthly report. The worst source of loss that most of the roads in the Middle West are subject to in connection with temporary grain doors is that pertaining to the doors which go off the line and for which no receipt can be obtained, or allowance, from such roads as do not return loads of grain. That is a question that I think the Master Car Builders' Association could look into and take some action on, which would help the situation and reduce the matter of cost of grain doors.

Mr. Seley—I would like to ask Mr. Barnum if the Burling-

ton provides any cover strip or lap between the sections of the temporary grain doors, one door being placed upon the other, to cover the joint.

Mr. Barnum—Our doors are not so made. They are made double, but we use what we consider very good material and we have had no trouble so far from leakage at the joints, as we aim to make the edges straight so that they will fit closely enough for all ordinary purposes. They would not fit closely enough to carry flax, but it is very doubtful if any permanent or temporary doors at present known will carry flax without some additional precaution inside of the door. Loads of flax are comparatively scarce, however. There are very few of the roads I think that get many loads of flax in a box car, and when they are received, the leakage can be stopped by lining the inside of the door with heavy paper or gunny-sacking or some similar material.

C. A. Schroyer (C. & N. W.)—There is no question connected with the box car that is of very much more importance than is the side door, and the grain door as well. We have about come to the conclusion now on the North Western that the best thing we can have for a side door is the flush door. In the last few years I have been keeping my eyes wide open as regards doors, and I believe a good flush door when given a sufficient amount of clearance, with a good big rabbett is the best door we can use. While this door is framed in such a way as to make a good door for a flush door, it can be used either way. Our doors are 5 ft. in the opening and even with that, and the quality of lumber we have got to use in our country for temporary grain doors, and nailed up in substantially the manner that is shown in this drawing, we find that it is a pretty difficult thing to get them to hold grain. It bulges out badly. If we get a door in there, fastened perfectly, it very frequently breaks. Our doors being 5 ft. in the opening, it doesn't necessarily follow that it would require as heavy lumber as this should, and I feel satisfied that $1\frac{3}{8}$ in. for the inside thickness and any thickness of rough lumber for the outside lapping of this door would be too thin for a 6-ft. door opening. The pressure against it is too hard. We use a cleat over the joint in ours, giving it about 2 in. lap on each side, sometimes a little more than that. As to the matter of providing strips for covering the joint between the doors, at all of our elevators, in addition to carrying these temporary grain doors in stock, we carry a supply of temporary grain door lumber, so that when a car is coopered they take from this temporary grain door lumber such materials as they need for covering these joints, and I am not so sure but that it would be a good idea in adopting a standard temporary grain door that we should name a price on it. Yet I think that the traffic departments have a knock-down price for cooperage of cars. Whether that would cut much of a figure I do not know, but I think this grain door, as suggested here, would be as good as any other door we could use for the purpose as a temporary door.

H. LaRue (C., R. I. & P.)—I have had the pleasure of attending the Managers' and General Superintendents' Association that meets at Chicago every month, and they have had up the question of the reclaiming of grain doors for the past year. They seem to think that the grain door is all right, but the loss is around the elevators and in reclaiming. There seems to be some disposition on the eastern lines not to work in harmony with the western lines. They have spent, I understand, over $500 in collecting data, etc., in regard to the subject, and I believe that within the next few months they will have a pretty good solution of the temporary grain door proposition.

T. H. Curtis (L. & N.)—I would like to ask the committee if they have carefully considered the door hasp. This door hasp is $1\frac{3}{8}$ in. wide, with the hole in it $\frac{1}{2}$ in., leaving $1\frac{1}{8}$ in. by $\frac{1}{4}$ in. of metal, which leaves approximately only 0.28 sq. in. of metal to hold the door shut. It has been our experience in the southern country that a great deal of damage is done to doors by breaking this insecure door hasp. We have found it necessary to increase the thickness of it materially. The breaking of this door hasp is not confined to the cars of any one company. It occurs with nearly all kinds of cars that have the outside sliding door. I notice that the door fastening or staple is not shown here.

There is another very important feature in the subject of doors, and that is the breaking of the door fastening or staple and the destruction of the closed door stop. I think it should receive consideration with this report, inasmuch as the door hasp and the door hasp staple have received consideration.

Mr. Morse—In regard to the door hasp, the design is based upon ordinary practice, which we strengthened somewhat. There was no criticism on the design presented at the last meeting, and we did not give it further consideration in revising the plate this year.

As regards a door fastener, it is almost universal practice to use a patented device, and, believing that the members of the association would not use the device which we would recommend if we recommended one, we decided to eliminate that from the drawing. We showed the holes for the door fastener and bolts with the idea of having the manufacturers of door fasteners arrive at a common standard, so the different fasteners could be used in repairs if necessary. Further than that we did not think it desirable to go.

J. W. Marden (B. & M.)—The discussion brings out the fact that we are not quite ready to adopt the recommendations of the committee as Recommended Practice, and in view of the information that has been given the committee by the members in the discussion, I move that the report be accepted and the committee continued.

Mr. Sanderson—Before you put that motion, Mr. President, I want to remind the convention that some years ago a similar committee was appointed, investigated car doors, avoided the rocks of patented devices, and recommended a door that was inserted in our proceedings. That door was an average poor evasion of all good qualities; it had to be, to keep away from patent troubles. Nobody used it and we cut it out. Now, I do not believe that we ought to try to put into our proceedings as a Standard the exact details, but stick to the leading dimensions, follow the idea of the coupler, use contour lines if you like, so that they all connect and interchange; stick to your bolt centers, getting your door brackets in the position in which they ought to be. Do not go to the thickness of the malleable iron, etc. There are a great many railways that object, and properly so, I think, to placing bottom brackets right at the corners of the door. They chew the corners off. They ought to be some distance back from the corner. It is a stronger position. You can then use four door brackets and keep the door on two brackets all the time, instead of having to use five. Then the exact location ought to be dependent to some extent upon the width of the door. There is some relation between the position of the brackets and the width, and I would urge the committee to consider that and try to give us something that will not give exact details, but will allow the different railway people to use their own details to meet their own conditions and yet be sufficiently uniform in general practice, as to position and size of bolts and so on, to make emergency repairs reasonably well with other people's material and get the car home without delay.

Mr. Marden—I am in accord with the sentiment expressed by Mr. Schroyer as to the flush door, and I would suggest that the committee include this in its report, giving its opinion of a flush door.

Mr. Seley—It does seem to me that we ought to have something better in our plates than the old plate there which, as the Committee on Standards called attention to two years ago, has not been revised for 10 years. I think that the report of this committee shows a very decided improvement on that old construction. We may be able to get a better door than there is here, but it is going to be a matter of progress.

Mr. Kleine—If the committee can have another year's time on this—it is a very difficult problem—it will present something to us which we can finally adopt. I think they should take into consideration Mr. Sanderson's remarks, which are very essential.

The motion to accept the recommendations of the committee and continue it was carried.

T. E. Clarke, General Superintendent of the D., L. & W., was then given the privilege of the floor. Mr. Clarke made a short address, including some remarks concerning salt water drippings from refrigerator cars, as follows:

No doubt you are familiar with the complaints emanating from the engineering departments and the action of the American Railway Engineering and Maintenance of Way Association in referring the matter to the American Railway Association. At the last meeting of the American Railway Association a number of operating men made a special effort to get something done through this association at this time instead of a progress report. I have felt for several months that I should be very much disappointed if you did not bring in something definite at this time, and not simply a report of progress. In reading the report of your committee, I find that you have made no small degree of advance, but are on the way to make rapid and good progress during the year.

There was no report of the committee on Train Pipe and Connections for Steam Heat. C. A. Schreyer (C. & N. W.), chairman of the committee, made a short statement, and the matter was referred to the Executive Committee.

The next subject was the report of the committee on Classes of Cars.

D. F. Crawford (Pennsylvania)—I have two letters here which I think will explain the status of the report of the committee on Classes of Cars. I addressed this letter to Arthur Hale, of the American Railway Association:

"On page 286 of the Proceedings of the American Railway Association covering regular session held in New York, in April, 1908, is a resolution regarding the reference to the question of harmonizing the terms for designating cars to the Master Car Builders' Association. Last July the Executive Committee of the Master Car Builders' Association appointed a committee to consider this subject, with J. E. Muhlfeld, then with the Baltimore & Ohio, as chairman. After Mr. Muhlfeld left the B. & O., H. M. Carson was appointed chairman, but he has recently been transferred to the position of general superintendent, which will prevent his continuing the chairmanship of the committee, and the president of the association has asked me if I cannot get together some information so that a report can be presented to the convention next June. Up to the present time, the committee does not seem to have had a very clear understanding of just what the American Railway Association desired in this matter.

"I understand that this subject was brought to the attention of the American Railway Association by either the Committee on Car Efficiency or the Car Accountants' Association. If this is the case, you undoubtedly can give me some idea as to just what the association desires. The work so far done seems to be in the line of designating by letters, or otherwise, the various classes of cars, somewhat similar to the car classifications used by the majority of railways."

Mr. Hale answered as follows:

"The question of harmonizing the terms of designating cars was originally brought up by the Association of Transportation and Car Accounting Officers through the Committee on Car Service. The first term which they wanted defined was a 'coal car.' The discussion developed that there was a good deal of difference in the minds of eastern men as to what was a gondola, and then the question came up as to what was a hopper gondola and whether a hopper gondola was different from the hopper.

"As time went on, the question was asked, 'What is a refrigerator car?' That is, must refrigerator cars have iceboxes; and later the question has been raised, 'What is a postal car?' also, 'What is a mail car?' and 'What is a tourist sleeper.'

"The M. C. B. dictionary is rather general in its terms, and it was thought that your association would be the proper one to give full definitions to all the terms in common use and invent proper terms where the vocabulary is not now sufficient.

"There are doubtless other undefined terms, and the thought was that a full set of names and definitions would be most desirable."

After receiving Mr. Hale's letter, I copied from the M. C. B. dictionary the terms used for the various names of cars, and also from the Pennsylvania Railroad schedule of power classification, and from the Interstate Commerce Commission report, which were the only sources available. After going over these, it seemed to me the only way to get a start on this matter was to send a circular to the various railways, as is usually done by committees. This was not done by this committee, as we did not have time, since April 8, to take such action.

This verbal report was received, and it was left to the Executive Committee to take such action as it may deem wise regarding a report on this subject for the next meeting.

The next report was that of the committee on Salt Water Drippings from Refrigerator Cars.

Mr. Barnum—I will read this report in abstract and will call particular attention to the latter part of it, which is new material, obtained since the original report was sent out, but before starting I would like also to explain that this entire subject matter, which I will present to you, was written before entering the hall and nothing in it has any reference to the address of Mr. Clarke which we have heard. Otherwise some of the remarks might be misunderstood.

Mr. Clarke—I am sorry that I was misinformed, that this matter had been passed upon before I made my remarks, so you will not feel that I presume to precipitate matters in any way.

Mr. Barnum—If I may reply for the association and our committee, I think there is nothing we could take exception to, except you overlooked the fact that we did not prefer the plan of conducting drippings to the track. We prefer another system, which we believe would be successful.

Mr. Barnum then read the following:

Your committee is convinced by the evidence obtained that drippings from refrigerator cars, using salted ice, do cause serious damage to rails and their fastenings, to bridges and to signal connections, the damage varying in proportion to the amount of this kind of business handled.

Drippings from ice without salt can do no more damage than rain or snow, and therefore refrigerator cars not equipped with tanks for using salted ice need no special arrangement for the drippings.

The packing companies own nearly or quite all the refrigerator cars in which salted ice is used.

The present M. C. B. Recommended Practice has been used only experimentally on a few cars which showed, 1st, that the numerous turns in the pipes prevented cleaning them, 2d, that they would freeze up, and 3d, that the location of pipes caused them to be torn off by brake rigging.

Other plans suggested for taking care of salt drippings are (1) to collect and retain them either in tanks inside of car, or (2) in tanks underneath the cars, or (3) to conduct them to a narrow pathway either in the center or alongside the track at the ends of the ties where they will do the least damage. We believe the first plan to be most promising; the second was considered and rejected by the former committee, while the third is merely a modification of the present Recommended Practice.

The winter and cold spring weather prevented practical tests up to the date of our report, but we have since made two tests with the assistance of the Armour Car Lines with refrigerators standing in their shops, which encourage us to believe that the salt water can be retained within the ice tanks themselves between icing stations without affecting the refrigeration of the car to an objectionable extent.

In both tests the overflow pipes were closed and all the brine retained in the ice tanks during the entire time.

The first test covered a period of four days, during which time the outside temperature varied from a minimum of 49 deg. to a maximum of 79 deg. The first icing reduced the temperature of the car to about 35 deg. within 5 hours. The car was again iced after about 20 hours and the temperature reduced to below the freezing point and maintained there for three days by means of re-icing at intervals of 24 hours.

The second test extended over a period of four and one-half days, during which the outside temperature varied between 50 deg. and 80 deg. In this test the temperature reduced more slowly, but was kept below freezing for three days. After about 48 hours it gradually increased, in spite of several re-icings, to about 32 deg. at the end of test, indicating that after the brine has absorbed a certain amount of heat, it must be discharged from the tanks in order to maintain the necessary degree of refrigeration.

To definitely determine whether this plan of retaining the brine in the ice tanks and draining it off at regular icing stations will work satisfactorily, it will be necessary to make additional standing tests and then to make road tests with cars under load during hot weather.

In view of the criticism which has been made of the work of this committee, we wish to add that at the committee meeting held June 22, the vice-president of the Maintenance of Way Association and three members of that association's Committee on Salt Water Drippings were present and expressed themselves as very much pleased with the progress of this investigation.

It also seems only fair to ask that the members of the M. C. B. Association bear in mind these facts:

First—That this committee was not appointed until after the close of last summer.

Second—That the committee met promptly and sent out a circular of inquiry, to which only about 15 replies were received, and of those less than half gave any data whatever bearing upon the subject.

Third—That to make any conclusive tests, either standing or in road service, hot weather is necessary.

Your committee has arranged to make these tests and would therefore recommend that the committee be continued.

J. E. Buker (Ill. Cent.)—I move that the committee report be received and that the committee be continued for another year.

Mr. Schroyer—I am especially gratified that the committee has said something that indicates that something can be done. I have believed for a number of years that it can be done. Some four years ago I took this matter up with Mr. Sharpe of the Armour Car Lines and talked the matter over with him at length. Nothing was accomplished, as the result of that talk, I believe it is known generally among the railway men that it is the dressed beef cars that are causing the trouble and not the dairy products cars where the fresh water discharges. I have no doubt but that a car can be constructed with an overflow tank located inside the car, if an overflow tank is necessary, and I believe the brine can be carried in the tank for a reasonable length of time and then discharged at our division terminals. I believe it will be necessary to discharge it oftener than the times at which the cars go to the icing stations, but at division terminals it can be done by the attachment of an overflow pipe reaching a certain distance up into the tanks, which will give evidence that the water is at a certain height and which will enable the division operators to open the valves

and discharge the water. I believe it is entirely practicable and I believe our committee is now on the right road to solve the problem.

T. E. Clarke (D., L. & W.)—I think Mr. Schroyer is right in saying that we can arrange satisfactorily to drain the tanks at division points. There will be an objection to it on account of the time that it takes—an objection from the traffic departments—but it will not be long-lived, and you need not be afraid of it. It will not take long after proper arrangements are made to have the matter in satisfactory operation, and it will not be difficult to make these arrangements.

The report was received and the committee ordered continued for another year.

The next report was that of the committee of the Revision of the Constitution and By-Laws. Mr. Crawford presented the report and also the following supplementary report:

In presenting this report and the proposed amendments to the constitution the committee desires to state that the amendments as proposed are made with the intention only of giving the officers and the executive committee full data to guide them in the performance of their duties, and, in the articles and sections regarding the membership, to carry out what the committee feels to have been the intention of the writers of the present constitution. In its investigation the committee found some 70 or 80 members of the association are no longer engaged in the railway or car owners' service, and feels that to permit this membership to continue without admitting others similarly engaged is discrimination, which was not considered desirable in an association of this kind.

In the opinion of the committee the intention of Sections 2 and 4, Article 3, of the present constitution is that only persons holding positions in the railway service and engineers not in commercial business are eligible to remain as members of the association, although the sections referred to make no reference as to the cessation of membership.

The committee will also propose an amendment, at the present session, to Article 3, Section 2, requiring the ownership of at least 1,000 cars to make persons employed by car owners other than railroads eligible for election to active membership. This is suggested on account of the fact that it would otherwise be difficult for the executive committee to pass on the eligibility of persons employed by car owners other than railways. This amendment will make the proposed constitution similar to the present constitution in this respect.

Associate Members.—The committee will present at the present session an amendment to proposed Section 4, Article 3, to increase the number of associate members from 20 to 50. This is suggested on account of the fact that a number of members who are now on the active list are eligible for associate membership under the proposed constitution. The present constitution, as printed and distributed, specifies that the number of associate members shall not exceed 30. This is in error, as the constitution printed in the Proceedings of the 1908 convention shows that the number of associate members is limited to 20.

The committee will at this session offer an amendment to Section 5, Article 3, to make eligible for life membership members who have served as president of the association.

Under Section 7, Article 3, of the proposed constitution, the executive committee will be authorized to transfer from active to associate membership such of the members as may be eligible, without the formality of election to associate membership.

The committee, in recommending the duties of the executive committee, follows what has been the practice of the association in the appointing of committees, the present constitution stating that committees would be appointed by the president, but as a matter of fact, for some years past, committees have been selected by the executive committee.

The section regarding the supervision of the executive committee over the work of the association suggested is that which has been embodied in the constitution of the Master Mechanics' Association, and, in the opinion of the committee, meets existing conditions more fully than the corresponding section in the present constitution of the Master Car Builders' Association.

The articles and sections in the proposed constitution covering the selection of candidates for office are suggested with a view of giving the members of the association the opportunity of selecting the nominating committee, rather than leaving this important duty in the hands of the president or the executive committee.

The method of balloting for officers suggested is the method used, not only by the government, but in other technical associations, and gives each member an opportunity to express his views.

The committee desires to offer, as it feels it has the same rights as other members, the following amendments to the proposed constitution, these being amendments which the committee have considered since the printed amendments were issued. In Article III of the constitution, Section 1, under Membership, we suggest that it read, "There shall be four classes of members—active, representative, associate and life members. Each member must sign the constitution, or authorize the Secretary to sign it for him."

Under Article III, Section 2, we make the following additional change over the amendment as already printed: "Sec. 2. Any person employed by a railway company or railway companies jointly, having charge of the designing, construction or maintenance thereof, and one representative from other companies owning or operating 1,000 cars or over, which are not in process of purchase by other parties and having charge of the designing, construction and maintenance of the car equipment thereof, may become an active member upon the approval of his application by the Executive Committee and payment of one year's dues," etc.

The committee also wishes to correct Article III, Section 2 by substituting the word "drop" for the word "expel." The word "expel" has been in the old constitution. We do not like to think that any of our members are going to be expelled. We would rather use the word "dropped."

The next change is in Section 4 of Article III. The proposed amendment to the constitution, as printed, reads: "The number of associate members shall not exceed twenty." We wish to recommend that that be made fifty, for the reasons given. There are a number of men now in active membership who are eligible under the new constitution for associate membership, and I think it would be very desirable as time goes on to extend the associate membership to people who are eligible because they can very often give us good assistance in our work.

Also, in that same section, we desire to strike out the word "expelled" and make it "dropped."

In Article III., Section 5, we desire to suggest that it be made to read: "Members of this association, either active or representative, who have been in good standing twenty years, or members who have served as president of the association, may become candidates for life membership on the recommendation of the Executive Committee."

In Sec. 6 is a section which was introduced to cover a section as a substitute for one in the present constitution which states that members who are guilty of "dishonorable conduct which is disgraceful to a railway officer and a member of the association may be expelled by a vote of two-thirds of the members present," etc. The committee felt that it would be better to follow the usual practice of other technical associations, and some of the semi-technical associations, and make this a matter of expulsion by charges. We hope such a thing will never occur, but all good and well-regulated constitutions have provisions of this character. We do not like this section as we first proposed it, and we want to change it to read as follows: "Sec. 6. Any member may be dropped from membership for cause prejudicial to the interests of the association by a vote of three-fourths of all the members of the Executive Committee; provided, that written notice of the charges preferred against him shall have been given him at least two months prior to such action."

The committee in making this revision of the constitution has one aim, and that is to put the present constitution in a little clearer form so as to make it easier for the officers and the Executive Committee to interpret its provisions. I have been a member of the Executive Committee two terms, covering two years each term, and I know some of the difficulties that confront the Executive Committee in connection with the present constitution and by-laws.

I want to call particular attention to Section 2 of Article II of the constitution, where we propose the following addition: "Subjects involving legal, transportation, permanent way or traffic questions, or for any other reason requiring such action, may be submitted as recommendations to the American Railway Association."

From time to time there are many things that come up in this association that could be best handled with the assistance of some other associations, such as the American Railway Engineering & Maintenance of Way Association. Where we run into a strictly legal, transportation or traffic problem, I do not think this association should attempt to handle it, pass resolutions or adopt reports that this association is unable to enforce, and this new section in our constitution will give us the privilege at any time of making our recommendations to the American Railway Association or asking its assistance, in the appointment of a committee to work with us, or in asking that association to request some other associations to work with us. For example, I think it would be very desirable to have the committee on Painting Steel Cars work with the Society for Testing Materials. I think it would be very desirable to have a clear-cut co-operation between this associa-

tion's committee on Salt Water Drippings and a committee of the American Railway Engineering & Maintenance of Way Association. I do not mean an exchange of courtesies between the committees, but good hard work, done in a co-operative way between the two committees. The whole object of the committee was to get the constitution of the association down to a point where we could do what I call brass tack work and co-ordinate the work as far as possible with the other railway associations with which we come in contact.

On behalf of the committee, I move that the constitution, as amended, be adopted.

G. W. Wildin (N. Y., N. H. & H.)—I want to turn to Article VIII, Sec. 2. According to the language in that section, a very small minority of the members of this association can elect a president. "The President and Treasurer shall be elected by written or printed ballots. The candidate receiving the largest number of votes shall be declared elected and shall hold office for one year or until his successor is chosen." I wish to strike out the words "largest number of votes" and substitute "majority of the votes cast." The Executive Committee presents us with three candidates for election, and we really have no choice outside of the candidates presented, and the one of the three receiving the largest number of votes, under this section, would be elected, although he might not be the choice of the members.

Mr. Crawford—I would like to correct your impression on that, Mr. Wildin, as to what the Executive Committee does. The Executive Committee presents to the association the names of 10 members, to be members of the Nominating Committee. The association casts its vote and determines which five of these 10 names, or any other names they want to add to the printed ballot, will become the Nominating Committee. The Nominating Committee will send out with the other papers, issued by the secretary, about the first of April, a list of the nominees it has selected to be presented under the constitution. The constitution specifically provides that the name of anybody else can be added to these ballots. It is merely the Nominating Committee's report. When it comes to the election, the Nominating Committee, in making its report, gives the names of three members as candidates for President, the names of six members as candidates for Vice-President, and the names of six members as candidates for members of the Executive Committee.

As to your suggestion that the vote for President and Treasurer be by a majority rather than the highest number of votes, if my colleagues on the Committee will accept that amendment, I would also.

Mr. Wildin—My only object in making this change is that the association desires a man whom they will respect to be at the head of this association. There is such a thing as the names of three candidates for president being voted on, and one man might receive 11 votes and the other two men 10 votes each, and the man receiving 11 votes, which would really be one-third of the votes cast, under the provisions of the article as at present framed, would be elected the president of the association, which I do not think is fair. Every man should have a run for his money.

Mr. Crawford—I agree with that idea, and it was the intention of the committee to give them the best run they could for their money. If Mr. Clarke and Mr. Curtis will accept that amendment, I will be glad to do so.

Mr. Clarke and Mr. Curtis indicated their willingness to accept the amendment.

The President—Mr. Wildin's motion is that Sec. 2 of Article VIII read as follows: "The President and Treasurer shall be elected by printed or written ballot. The candidate receiving a majority of the votes cast shall be declared elected and shall hold office for one year or until his successor is chosen."

Mr. Schroyer—I want to make the objection, that under this provision of the constitution, you should make some arrangement for dropping the person receiving the least number of votes, because we might continue to ballot indefinitely, and not elect anybody.

Mr. Crawford—If we continue to vote indefinitely, and not elect anybody, it is evident that the men do not suit us. I think the method of taking the ballot, where each member marks on a slip the candidate for whom he is in favor, is the best way to handle the matter, and I do not think we should make any provision to drop anybody. If any member of this association wants any particular man elected as president, let him make his ballot in accordance with his wish, and stick to it, until we get a satisfactory election.

Mr. Sanderson—Before the motion is put, I would say a word or two. This, as I understand it, is a duplex association—executive and technical. The constitution provides for representation by a representative vote. I believe that the constitution could be wisely modified so that only representative members could have the privilege of voting either by ballot, which is the present form, or viva voce, on any subject bearing on the expenditure of money or the transaction of the business of the railways interested.

Mr. Seley—I take objection to that statement. The M. C. B. Association is very largely an absolutely voluntary association on the part of the men who have built the cars of this country. It is quite correct that in binding our companies to accept standards, etc., there is a representative vote, but if this association is to be continued and to have the personal interest and time and the personal expenditure that does not go into our expense accounts to maintain the interests of the association, to make possible this magnificent exposition of affairs, do not cut it down to a representative vote on matters outside of the standards.

Mr. Sanderson—I did not suggest that, Mr. Seley. It was only in the matters pertaining to the expenditure of moneys of the companies we represent that the representative vote should apply. So far as all technical matters and general expenses are concerned all active members should have the same vote as the representative members.

A. M. Waitt—As one of those who will naturally and properly be affected by the revision of this constitution, being no longer in railway service, I want to say I have carefully considered the new constitution and talked with the chairman of the committee and I heartily endorse the motion that is made and hope it will prevail. I believe that, in order to maintain the dignity and best work of this association and prevent any possible stigma of criticism coming upon it, that when a person leaves active railway service he should leave active membership in the association. If I join the fraternity of those soliciting business and orders for material from members of the association I think it is only proper that I should cease, under those circumstances, from being a member, and I surely hope that the constitution, and the amendments as proposed, will be carried.

Mr. Wildin's motion was carried.

The President—Mr. Crawford's motion to adopt the amended constitution and by-laws as a whole, will not be voted on. Under Article XI. of the constitution it becomes necessary to have a two-thirds vote in favor of this committee report for the adoption of the constitution. We are now voting on the constitution as a whole, as amended by the committee and recommended by the committee, and it is open for adoption and rejection. This vote also includes the by-laws.

The vote was then taken and there were 85 members who voted in favor; none opposed.

The next report was that of the committee on subjects. The Secretary read the report, and it was referred to the incoming Executive Committee to consider in connection with the programme for the convention next year.

The Secretary then presented the report of the Auditing Committee, as follows: Your Auditing Committee have examined the books of the Secretary and Treasurer and found them correct. L. R. Pomeroy, Ethan L. Dodds, Ira Everett, Committee.

The Secretary—I have the reports of the committee on Correspondence and Resolutions, which is as follows:

Your committee on the foregoing subject begs leave to advise that the association is under special obligations to the officers and the Secretary, for the admirable manner in which the proceedings and deliberations of the session have been conducted; to the various committees appointed to consider and report on the subjects assigned to them, and for the thorough manner in which they have performed their duties; to the Committee of Arrangements for attending so well to the comfort and pleasure of those in attendance.

To the Pennsylvania Railroad, the Central Railroad of New Jersey and the railways in general throughout the country; also the Pullman Company for the courtesy of transportation to the members and their families.

To the Railway Supply Men's Association for the magnificent exhibition of railway appliances and their untiring efforts in looking after the comfort and pleasure of the members and their families.

To the *Railroad Age Gazette* for its daily issue giving reports of the convention and record of items of interest pertaining thereto; to the press in general for their co-operation and efforts toward the success of the gathering; to the various hotels for their contribution and hospitality toward the general comfort of the members and their families and friends.

Therefore, be it resolved: That as a record of their appreciation and thanks, the foregoing minute be incorporated in the records of this meeting. L. R. Pomeroy, Le Grand Parish, C. A. Schroyer, Committee.

The report was adopted.

Mr. Sanderson—If it is in order now I would like to bring up a question brought up at the meeting of the Master Mechanics' Association. In the address of the president of the Master Mechanics' Association he touched on the advisability at this time of seriously considering whether the two

associations could not be amalgamated for the benefit of both, and I understand they appointed a committee to confer with the committee of this association to see what could be done in that direction. I move that this association appoint a committee to meet with and work with the corresponding committee of the Master Mechanics' Association and see whether such an amalgamation is practicable, and, if possible, draft a preliminary constitution for the amalgamation of the two associations into one for the benefit of both.

The secretary announced, as the secretary of the Master Mechanics' Association, that a committee was appointed to confer with the Master Car Builders' Association, looking toward the amalgamation of the two associations.

The motion of Mr. Sanderson was then put to vote and carried.

E. I. Dodds (Erie)—There is a matter I would like to take up with the association in regard to stolen brasses. This spring I had occasion to go up to Canada to identify a lot of stolen brasses, several thousand in number. They were brasses stolen from the Erie, the Lackawanna, the Lake Shore, the Pennsylvania, and various other roads. Our police department traced those brasses up to Canada and we went up to identify them. The authorities in Canada wanted us to identify them, as to whether they were new or had been used. I found about 50 per cent. of them had been used and the balance were new. A Hebrew gentleman by the name of Harris, the scrap dealer in London, Canada, who had those brasses in his warehouse, advised me that over 100 carloads of brass went up to Canada within the last year, locomotive and car brasses. Our police department asked me to take this matter up, said they had caught men taking the brasses out of the cars at our yard at Jersey City, and had taken the men to police headquarters but could not convict them. I wonder if there could not be worked out some method of identifying the brasses or disposing of the scrap ourselves so as to prevent this. We had over 5,000 brasses stolen last year. It runs into money and all the roads are experiencing the same trouble.

The President—If you present a resolution it can be referred to the Executive Committee for such action as they deem advisable, to bring it before the convention.

Mr. Dodds—I would suggest that it be placed before the Executive Committee.

Mr. McIntosh—I would second that motion, with the suggestion that the Executive Committee or the Committee on Resolutions give it careful attention, because it is a serious matter.

Le Grand Parish (L. S. & M. S.)—Mr. President, this involves the legal department very seriously. It is a matter that we simply cannot handle beyond making a recommendation to our legal departments. We all know that when we apply a brass to a foreign car it is charged to the foreign Company, it becomes their property, and therefore any identification mark we put on the brass is not sufficient to prove ownership. This is a thing that has been thought out by every railway in the United States, and there has got to be legislation of some kind—national legislation—to do anything with it. We simply have all to give it up when we come to the question of identification because we cannot prove ownership.

Mr. Sanderson—Mr. President, I suggested to Mr. Fowler to arrange with the Dominion government to put a prohibition on brass, and that will take care of this trouble.

A. E. Manchester (C., M. & St. P.)—I believe there is law enough. It only wants to be enforced. We have had a lot of trouble in that direction, but there was a case of six men brought before one of our judges at Milwaukee about a month ago and they all got from two to four years in state prison, and I think that will help some.

Mr. McIntosh—I don't know about Wisconsin, but Jersey justice is very substantially fair, and I find that in Jersey we cannot accomplish very much.

The motion that the resolution proposed by Mr. Dodds be referred to the incoming Executive Committee for such action as they may deem advisable was carried.

The officers for the ensuing year are as follows:

President—F. H. Clark (C., B. & Q.).

First Vice-President—T. H. Curtis (L. & N.).

Second Vice-President—LeGrand Parish (L. S. & M. S.).

Third Vice-President—A. Stewart (Southern).

Treasurer—John Kirby, Adrian, Mich.

Executive Committee—D. F. Crawford (Pa. Lines); F. W. Brazier (N. Y. Cent.); C. A. Schroyer (C. & N. W.); J. D. Harris (B. & O.); C. E. Fuller (U. P.) (hold over); H. D. Taylor (P. & R.) (hold over).

The President—It is my pleasure at this time to turn over the gavel to my worthy successor, Mr. Clark. I want to thank you for the kind consideration extended to me during the few days past during the convention.

President-elect Clark—Gentlemen, I want to thank you for the honor conferred upon me in naming me president of the association. I have had an idea that you could have done better, but you have used your usual good judgment in the selection of the remainder of the ticket and so assured yourselves, I think, of a safe and sane administration. In the adoption of the new constitution, Article VI, Section 4, it is provided that "the Executive Committee shall offer to the convention the name of ten active or representative members, not officers of the association, as candidates for the Committee on Nominations, provided that on the adoption of these amendments the president will appoint a Committee on Nominations of five members to serve until their successors are elected."

I have an idea that the retiring president ought to have appointed that committee, but as he has not done it I will appoint J. S. Lenz, J. F. Deems, R. F. McKenna, A. W. Gibbs and Joseph E. Buker.

Mr. Seley—I would move that a rising vote of thanks be extended to the retiring President as an appreciation of the able manner in which he has conducted the work of his office during the past year and the past few days.

Carried by rising vote.

Alexander Turner—Mr. President, officers and members: I take pleasure in presenting Mr. Blewett, who has been requested to represent the Supply Men's Association in your closing exercises.

Scott H. Blewett (Am. Car & F. Co.)—Mr. President, members of the Master Car Builders' Association and Mr. McKenna: To me has been appointed the pleasant duty of giving to you the distinctive physical mark that you are an ex-President of this Association. Neither do your associates nor your friends of the Railway Men's Supply Association note with pleasure your being an ex-President, but your term of office has expired and your successor has been chosen, and yours is now one of the names that constitute the roll of honor. Though this jewel, sir, be of priceless intrinsic worth, it would be a mere bauble if we gave it to you for that reason. It stands for esteem and love and should be significant to you of those sentiments, and a talisman calling up to your memory the names and faces of those to whom you have been a leader and an inspiration.

Mr. McKenna—Mr. Bluett, Mr. President and Gentlemen: After that most gracious speech I hardly know what to say, but I can say this, that it has been a source of great pleasure and profit to me to participate in the work of this association in my capacity during the past year, and particularly so during the past few days. It will be my pleasure to wear this token on all fitting occasions, and I shall look back upon these hours with a great deal of pride. I appreciate the honor afforded me in presiding over your deliberations and I trust I and many of my successors may be able to wear a similar badge as representing the Master Car Builders' Association. I thank you.

Adjourned.

A prominent part of the exhibit of the Crane Company, Chicago, consisted of various forms of traps for steam heating of roundhouses, shops, etc. These were shown in regular operation with a small boiler. They included tilting traps, known as the Cranetilt trap, and are adapted for a direct return system or non-return. The working model showed the Cranetilt steam traps returning condensation automatically to a power boiler. Among the numerous fixtures exhibited by the company were malleable iron blow-off cocks for locomotives. These valves have brass seats and are much cheaper than the solid brass valves. The company exhibits also its ferro steel valve for hot water washout systems, and hydraulic fittings for riveting plants, etc.

The McCord Company, Chicago, exhibited a recent improvement in the lid of its journal box. This dispenses with the riveted pin which has been used for the hinge. The lid is cast with small hinge lugs which fit into suitable recesses in the box. It also has lips top and bottom which fit on the box, making a light joint and serving to support the weight of the lid. The spring tends to hold these lips tight against the box vertically as well as laterally. The pocket for a flat spring is retained in the new lid so that it can be repaired in that way if necessary. The company exhibited also one of these friction draft gears which had been in service some two years and shows very little wear in the friction elements.

PAINTING STEEL CARS.*

The committee sees no reason why its last year's recommendations should be changed.

The committee has examined a number of cars which it had under test and which were in ordinary service. Each car was thoroughly cleaned before painting. The results of the various tests are as follows:

One car given two coats of a special black paint and then coated over with crude petroleum oil. After fifteen months' service it was found that the painted surface of the car was in fine condition, and there is a showing of the crude oil still clinging to the paint surface.

One car given two coats of a special black paint, was then coated over with locomotive cylinder oil. After fifteen months' service it was found that the painted surface of the car was in fair condition. Committee is inclined to believe that the application of the locomotive cylinder oil had a tendency to extend the elastic life of the paint.

One car given two coats of a special black paint, was then coated over with a good quality of fish oil, applied with brush. After being in service fifteen months the condition of the paint was very fine indeed, but there was no indication of the surface oil at time of inspection.

One car given two coats of common red car paint generally used by railways was then covered with equal parts of raw linseed oil and pure glycerin. After being in service fifteen months it proved to be the slowest in drying. The painted surface was in good condition.

One car given two coats of common red car paint was then given a coating of "Cleanola." After being in service fifteen months the paint was found to be in fair condition. It also shows some preservation.

One car given two coats of common red car paint was then covered with a coat of well-rubbed-in commercial tallow. After this car had been in service fifteen months the paint was found to be in fair condition, but no traces of the overcoat of tallow remains.

One car covered with two coats of a special black paint. (No preservative applied.) After being in service eight months the paint was found in remarkably good condition, notwithstanding the fact that there appears to be much material brittleness, also loss of weight in scrapings.

One car given two coats of a special black paint, was then covered with a special manufactured over oil. After being in service eight months the paint was found to be broken in places; the scrapings appear to be soft, broken and tacky.

Six cars were thoroughly cleaned out on the inside and with an atomizing machine were given two coats of crude petroleum oil. After being in service fifteen months the interior was examined. To the eye and touch these surfaces did not give the slightest indication of the previous bountiful oil coating. If this treatment acts as a preservative in any form the insides should be treated at least every six months.

The committee at the present time has under test twenty-five steel cars which have had the insides sand-blasted and the seven following mixtures applied heavily and not brushed out:

No. 1.		*No. 5.*	
Petrolatum	30 lbs.	Tar	30 lbs.
Raw linseed oil	210 "	Aniline oil	40 "
No. 2.		Raw linseed oil	170 "
Petrolatum	30 lbs.	*No. 6.*	
Corn oil	210 "	Tar	30 lbs.
No. 3.		Aniline oil	40 "
Petrolatum	30 lbs.	Portland cement	30 "
Crude oil	210 "	Corn oil	140 "
No. 4.		*No. 7.*	
Tar	30 lbs.	Tar	30 lbs.
Aniline oil	40 "	Aniline oil	40 "
Corn oil	170 "	Portland cement	30 "
		Raw linseed oil	140 "

Three cars received mixture No. 1; three cars No. 2; three cars No. 3; three cars No. 4; four cars No. 5; four cars No. 6, and five cars No. 7.

Two cars bearing mixture No. 1 were examined after being in service four months and twenty-nine days and found to have sides and ends in fair condition, but paint was gone from the bottom and no scale accumulated on the inside of car.

One car bearing mixture No. 2 was examined after being in service four months and twenty-six days and found to have sides and ends fairly well preserved, but paint gone from the bottom and no accumulation of rust.

Two cars bearing mixture No. 3 were examined after being in service four months and twenty-one days and show the sides and ends somewhat protected, but considerable rusting going on. This mixture did not retard rusting as well as mixtures Nos. 1 and 2.

One car bearing mixture No. 4 was examined after being in service four months and seventeen days and shows the inside well preserved, but considerable of the paint gone from the bottom, yet there seemed to be retardation of the rusting and no accumulation of scale. This mixture shows better results than mixtures Nos. 1, 2 and 3.

One car bearing mixture No. 7 was examined after being in service four months and shows sides well preserved, but bottom somewhat rusted. This car was in a better condition than any of the other cars inspected and would indicate that No. 7 mixture is preferable and would be especially valuable from the tests so far made. To get the best results from a coating of this kind, one coat should be applied about once every six or eight months.

It is not fair to draw a conclusion as to which of these inside mixtures is the best, as the cars have not been in service long enough.

The committee realizes the necessity of a continuation for another year in order to further determine the results of the tests now being made. It desires to give the association, in its final report a formula for the inside and outside coating of steel cars, and by continuing the committee for another year it hopes to be able to do this.

*Abstract of report presented at the annual convention of the Master Car Builders' Association. Committee: G. E. Carson (chairman), T. Rumney, G. A. Schmoll, J. M. Shackford, J. T. Wallis.

SALT WATER DRIPPINGS FROM REFRIGERATOR CARS.*

This committee was appointed at the request of the American Railway Association.

At the convention of 1898 a committee reported on this subject (see Proceedings 1898, pages 83-86) and stated:

1. "That more interest is being taken in the subject by the officials in charge of the track and bridges than by those in charge of rolling stock, which is accounted for by the fact that the track and bridges are being more damaged by salt-water dripping than the car trucks."

2. "That in refrigerator cars loaded with dressed beef the mixture used for cooling purposes is composed of ice and salt, the proportion of the salt to the ice varying from 6 to 11 per cent."

3. "That one refrigerator car will produce about 200 gallons of salt water or brine every twenty-four hours, which, on an average, will contain 8½ per cent. of salt."

The committee at that time started out with the idea of having refrigerator cars fitted with one or more reservoirs, to be attached underneath the car body, into which the salt-water drippings could be conveyed, the reservoirs to be large enough so that they would not have to be emptied more than once every twelve hours at terminals where proper provision could be made for taking care of the salt water, but the idea met with so much opposition that the committee abandoned it, and recommended two methods of allowing the water to drip in the center of the track, one of which was adopted by the Association as Recommended Practice, and is shown on Sheet M. C. B.—A, Proceedings 1907.

The appointment of a committee to reconsider this question would indicate, first, that the complaints of damage to track, bridges, etc., have continued, and with increasing force, and, second, that the Recommended Practice has not been found satisfactory.

Sufficient evidence has been collected by the committee to convince any fair-minded person beyond question that the drippings from refrigerator cars using salted ice do serious damage to the rails and fastenings, bridges and other metal parts pertaining to the roadway, in proportion to the amount of this kind of business handled; the damage being greatest on elevated curves, at coaling and water stations, and other localities where such cars are started and stopped.

The committee finds that the present Recommended Practice has only been used experimentally on a few cars, which developed the following objections:

1. The numerous turns in the pipes prevent cleaning out sawdust and other obstructing matter.

2. The pipes freeze in cold weather.

3. The location is such that the pipes are easily torn off by the brake rigging.

The committee therefore concludes that the device shown on Sheet M. C. B.—A is unsatisfactory and impracticable, but favor retaining it pending investigations and tests now under way.

The committee has done some experimental work which does not yet justify drawing conclusions, but it is being continued with the expectation that during the coming year the tests will be completed, and definite recommendations made.

Three methods have been suggested for taking care of salt-water drippings.

*Report presented at the annual convention of the Master Car Builders' Association. Committee: M. K. Barnum (chairman), G. W. Lillie, W. E. Sharp, E. W. Pratt, P. Maher, D. C. Ross, W. C. Arp.

1. Tanks located inside of the car, below the ice tanks, to catch and retain the drippings until arrival at an inspection point, where they could be drained.

2. Tanks suspended underneath the car between the trucks.

The principal objections raised to both of these plans are that they would cause serious delays to refrigerator trains in yards where the draining of the tanks is to be done.

The handling of refrigerator products is essentially a main line business, similar to passenger service, and any delays incident to the transfer of such business to a switch track with drains for receiving the salt water would not be tolerated by transportation officials.

Another objection to such systems would be the necessity for installing a system of conduits for carrying off the salt water.

The first plan is also open to the following objections:

The use of water tanks inside the car would necessitate reducing either the size of the ice tanks or the space for the revenue load, because refrigerator cars are now built to receive an exact number of cases of a standard size and any encroachment on this space will reduce the carrying capacity of the car.

The successful transportation of meat products requires a constant or gradually lowering temperature in the car. The use of such tanks inside of car might have a tendency to increase the temperature, thereby affecting the condition of the contents on arrival at destination.

The location of tanks inside of car would also make it more difficult to repair draft rigging and sills.

The second plan suggested would be usable only during warm weather, because the pipes would freeze in winter. Furthermore, the space underneath a refrigerator car is now so taken up with trucks, brakes, needle beams, truss rods, etc., that it would be difficult to find space for tanks which must hold at least 200 gallons.

3. That drippings be conducted to a narrow pathway alongside the track at the ends of the ties and so scattered that they will do the least damage, and that the roadbed be given special attention at this point, about four feet or four feet six inches from center of track, to provide against this damage. This is a modification of the present practice and probably will not meet the approval of the Maintenance of Way Department.

All three of these plans are being studied in detail with the view of determining their cost and testing their efficiency.

It has been impossible to make all desired tests in time for this convention and the committee would therefore recommend that the subject be continued so that the work, as outlined, can be completed.

REVISION OF CONSTITUTION AND BY-LAWS.*

The proposed changes in, and additions to, the present Constitution and By-Laws are shown by italics.

It is suggested that the provisions of this revised Constitution regarding the election of officers become effective at the convention of 1910.

CONSTITUTION.

ARTICLE I.

No change.

ARTICLE. II.

SECTION 1.—The objects of this Association shall be the advancement of knowledge concerning the construction, *maintenance* and service of railroad cars *and the parts thereof, by investigations through committees and discussions in convention:* to provide an organization through which the members and the companies they represent may agree upon such joint action as may be required to bring about uniformity and interchangeability in the parts of railroad cars, to improve their construction, and to adjust the mutual interest growing out of their interchange and repair; but the action of the Association shall have only a recommendatory character, and shall not be binding upon any of its members or the companies represented in it.

Sec. 2. Subjects involving legal, transportation, permanent way or traffic questions, or for any other reason requiring such action, may be submitted as recommendations to the American Railway Association.

ARTICLE III.

SECTION 1. No change.

SEC. 2. Any person *employed by a railroad company, railroad companies jointly, or other companies* owning *or operating railroad* cars, *and having charge of the designing, construction, maintenance or inspection of the car equipment thereof,* may become an Active Member *upon the approval of his application by the Executive Committee and payment of one year's dues; this membership to* continue until his written resignation is received, *unless expelled from the Association or his membership terminated by retiring from railroad or other designated companies' employment, or by non-payment of dues.*

Active members are entitled to one vote on all questions. A candidate for admission to the Association as an Active Member must make application on a form approved by the Executive Committee, upon which he shall make a statement, giving an account of his qualifications, and an agreement that he will, if admitted, conform to the Constitution, By-Laws and Rules of the Association. He must refer to at least three Active or Representative Members to whom he is personally known.

SEC. 3. Any person having knowledge of car construction may become a representative member by *presenting* a written appointment from the President, *Vice-President,* General Manager or General Superintendent of any railroad to represent its interest in the Association; provided, that no representative member shall represent more than one railroad or system of railroads.

Similarly, any person having knowledge of car construction may become a Representative Member from a private car *or other company owning or operating railway cars,* by presenting a written appointment from the president, vice-president or general manager of the company; providing that said company owns or operates one thousand cars or over. *Representative Members* shall have all the privileges of an Active Member, including one vote on all questions, and shall, on all measures *affecting the interests of the companies represented which the majority of the Association decide shall be determined on the basis of the cars represented,* have one vote for each one thousand cars which are owned or which are in use or progress of purchase by the road, system, private car *or other company* which he represents. His membership shall continue until notice is given the Association of his withdrawal or the appointment of his successor. No railroad, or system of roads, private car lines, or *other companies owning cars* under one general manager or general superintendent shall have more than one Representative Member. In the enumeration of cars, four axles to count as one car.

SEC. 4. Engineers or other persons having such knowledge of science, or experience in matters pertaining to the construction of cars, as would be of especial value to the Association or railroad companies, *may be proposed for* Associate Members by three members not Associates. The names of such candidates shall then be referred to the Executive Committee, which shall report to the Association on their fitness for such membership. They shall be elected by *written or printed* ballot at any regular meeting of the Association held not less than six months after a candidate has been proposed, and five dissenting votes shall reject.

The number of Associate Members shall not exceed twenty.

Associate Members shall be entitled to all the privileges of Active Members, excepting that of voting and being elected to office in the Association.

Such membership shall continue until written resignation is received by the Secretary, unless expelled from the Association or the membership is terminated by the non-payment of dues or by the member becoming engaged in business which, in the judgment of the Executive Committee, would impair his usefulness to the Association or discriminate against others similarly engaged.

SEC. 5. Members of this Association, either Active or Representative, who have been in good standing twenty years, may become candidates for life membership on the recommendation of the Executive Committee. The names of such members shall be referred to the Association in convention for election by *written or printed* ballot at any regular meeting of the Association, and five dissenting votes shall reject.

Sec. 6. Any member may be dropped from membership or expelled for cause by a vote of three-fourths of all the members of the Executive Committee; provided, that written notice of the charges preferred against him shall have been given him at least two months prior to such action.

Sec. 7. Upon the adoption of these amendments to the Constitution, the Executive Committee will pass on the eligibility of the present members under the Constitution as amended, and the membership of those found not to be eligible will terminate on the expiration of the dues already paid.

ARTICLE IV.

SECTION 1. The officers of the Association shall be a President, three Vice-Presidents, Treasurer, Secretary and six Executive Members.

*Report presented at the annual convention of the Master Car Builders' Association. Committee: D. F. Crawford, F. H. Clark, T. H. Curtis.

The committees for conducting the work of the Association as an organization shall consist of an Executive Committee of eleven members, including the President, the three Vice-Presidents, the Treasurer, and the six Executive Members, and a Committee on Nominations of five members.

ARTICLE V.

SECTION 1. No change.

ARTICLE VI.

SECTION 1. The Executive Committee shall exercise a general supervision over the interests and affairs of the Association, recommend the amount of the annual assessment, call, prepare for and conduct general conventions, and make all necessary purchases, expenditures and contracts required to conduct the current business of the Association, but shall have no power to make the Association liable for any debt to an amount beyond that which at the time of contracting the same shall be in the Treasurer's hands in cash, and not subject to prior liabilities.

It shall make a report at each convention which shall cover the action it has taken and the recommendations it may have to suggest on questions of importance to the Association.

Sec. 2. The Executive Committee shall select and appoint the members of the several standing committees and of such special committees as may be found necessary from time to time for conducting the business of the Association, and for investigating such matters as the Association may refer to the Executive Committee or the Executive Committee may deem expedient to carry out the purposes of the Association. It shall make appointments in the membership of any of the committees that may be necessary to fill any vacancies which may occur.

Sec. 3. The Executive Committee shall receive, examine and approve before public reading, all communications, papers and reports, and it shall decide what portion of the reports, papers and drawings shall be printed in the annual report It shall also determine which, if any, of the subjects presented at the convention, or by the members shall be referred to the American Railway Association.

Sec. 4. The Executive Committee shall offer to the convention the names of ten Active or Representative Members, not officers of the Association, as candidates for the Committee on Nominations; provided, that on the adoption of these amendments the President will appoint a Committee on Nominations of five members to serve until their successors are elected.

Sec. 5. Two-thirds of the members of the Executive Committee may call special meetings of the Association, to be held not less than thirty days after a notice thereof has been mailed to each member of the Association.

Sec. 6. Five members of the Executive Committee shall constitute a quorum for the transaction of business.

ARTICLE VII.

COMMITTEE ON NOMINATIONS.

Section 1. It shall be the duty of the Committee on Nominations to offer to the convention the names of three persons as candidates for President, the names of six persons as candidates for Vice-Presidents, the names of three persons as candidates for Treasurer, and the names of six persons as candidates for Executive members. Each person so named shall be either an Active or Representative Member of the Association.

ARTICLE VIII.

ELECTION AND APPOINTMENT OF OFFICERS AND TENURE OF OFFICE.

SECTION 1. No change.

SEC. 2. The President and Treasurer shall be elected by written *or printed* ballots. The candidate receiving the largest number of votes shall be declared elected, and shall hold office for one year or until his successor is chosen.

SEC. 3. *The Vice-Presidents and Executive members shall be elected by written or printed ballots.*

The Vice-Presidents shall hold office for one year and the Executive members for two years, or until their successors are chosen.

Three Vice-Presidents and three Executive members to be elected each year.

SEC. 4. In the election of Vice Presidents *and Executive members*, each Active and Representative member may cast *one vote for each Vice-President and for each Executive member* to be elected.

COMMITTEE ON NOMINATIONS.

SEC. 5. *The members of the Committee on Nominations shall be elected by written or printed ballots, and shall hold office for one year, or until their successors are chosen.*

Sec. 6. In the election of the members of the Committee on Nominations, each Active and Representative Member may cast one vote for each of the members of the committee to be elected. The five candidates who receive the largest number of votes shall be declared elected.

SEC. 7. A Secretary, who may or may not be a member of the Association, shall be *elected* by a majority of the Executive Committee at its first meeting after the annual election, or as soon thereafter as the votes of a majority of the members of the Executive Committee can be secured for a candidate. The term of office of the Secretary thus *elected*, unless terminated sooner, shall cease at the first meeting, after the next annual election succeeding his appointment, of the Executive Committee organized for the transaction of business. Two-thirds of the members of the Executive Committee shall, however, have power to remove the Secretary at any time. His compensation, if any, shall be fixed for the time that he holds office by a vote of a majority of the Executive Committee. He shall also act as Secretary of the Executive Committee.

The Secretary shall be required to give bond to an amount which a majority of the members of the Executive Committee may require.

SEC. 8. The Treasurer shall be required to give bonds to an amount which a majority of the members of the Executive Committee demand. No bill shall be paid by him for the Association, excepting for current expenses, until it has been certified by the person or persons authorized to contract it.

ELECTIONS.

Sec. 9. At the first session of the annual meeting the report of the Committee on Nominations, announcing the names of the nominees for officers of the Association to fill vacancies for the ensuing year, shall be read. The election shall not be held before the day after such announcement, except by unanimous consent. Votes may be cast for any member eligible to serve as President, Vice-President, Treasurer, Executive Member or member of the Committee on Nominations, by adding the name to the printed ballot.

Sec. 10. In all ballots for President, Vice-Presidents, Treasurer, Executive Members, Committee on Nominations, or Associate or Life Members at the meetings of the Association, in order to preserve the secrecy of the ballot the following form of voting shall be adhered to: An envelope shall be provided on which there shall be a blank space for the name of the member; smaller envelopes shall be provided on which shall be printed the words "For Officers," "For Executive Members," "For Committee on Nominations," "For Associate and Life Membership," and otherwise unmarked. In these envelopes the ballots shall be placed by those voting them; and they shall then be placed within the larger envelope and presented to the general tellers. When a ballot is to be taken the President will announce the names of all required tellers. Three general tellers shall have charge of receiving and recording the ballots cast. When all ballots have been cast these tellers will announce that the polls are closed. They shall then remove the smaller envelopes, count, and announce the vote for officers, and shall deliver the envelopes marked "For Executive Committee" to two tellers, who shall count and announce to the general tellers the vote for Executive members, and those marked "For Committee on Nominations" to two tellers, who shall count and announce to the general tellers the vote for the Committee on Nominations, and those marked "For Associate and Life Members" to two tellers, who shall count and announce to the general tellers the vote for Associate and Life Membership.

The general tellers shall record and announce the total number of votes cast, the result of the vote, and shall be the judges of eligibility of any ballot presented.

When a ballot for officers or membership on committees shall be announced as having eventuated in a tie vote, or be otherwise undecided, upon such announcement the final result shall be determined by the majority of the members present.

ARTICLE IX.

Section 1. Unless otherwise provided herein, a vote in the session of the Association may be taken viva voce, by arising or by written or printed ballot, in any of which only Active and Representative members shall participate. Letter ballots may be ordered to be taken in such manner and under such conditions as the Association may, by resolution from time to time, direct.

ARTICLE X.

SECTION 1. At the first session of each annual meeting, an Auditing Committee consisting of three members, not officers of the Association, to be nominated by any members who do not hold office shall be elected.

The Auditing Committee shall examine the accounts and vouchers of the Treasurer *and Secretary*, and certify whether they have been found correct or not. After the performance of this duty they shall be discharged by the acceptance of their report by the Association.

ARTICLE XI.

THE RECOMMENDATION OF STANDARDS.

SECTION 1. Same as Article IX, Section 1. No change in text.

SEC. 2. Same as Article IX, Section 2. No change in text.

ARTICLE XII.

ANNUAL CONTRIBUTIONS.

SECTION 1. Every member will be subject to the payment of annual dues, to be assessed at each annual meeting, to defray the necessary expenses of the Association, provided that no assessment shall exceed $8. Each Representative Member shall pay, in addition to his own dues so assessed, the same amount for each additional vote to which he is entitled.

Such dues shall be payable when the amount thereof is announced by the President at each annual meeting, and no member who is one year in arrears shall be entitled to a voice in the Association. The name of any member who is three years in arrears for dues may be struck from the list of members at the discretion of the Executive Committee.

Life members shall be exempt from the payment of dues.

Upon resignation or termination of membership, dues already paid will be refunded, prorated by months elapsed between the time of annual assessment and the date membership ceases.

ARTICLE XIII.

AMENDMENTS.

SECTION 1. No change proposed.

BY LAWS.

TIME OF MEETING.

I. The regular annual meeting of the Association shall be held in June of each year. The date of commencement of such meeting shall be fixed by the *Executive Committee* acting jointly with the *Executive Committee* of the American Railway Master Mechanics' Association.

HOURS OF SESSION.

II. The regular hours of session shall be from *9* A.M. *to 12:30* P.M., *and from 2* P.M. *until 4* P.M. *The morning sessions of the Association may be prolonged to 1:30* P.M., *and the afternoon sessions omitted by vote of the majority present, or the afternoon sessions of the second or other days of the convention, by resolution, may be made an executive session for the consideration of special subjects, but due notice of such proposed action must be given on the day previous.*

PLACE OF MEETING.

III. The place for each annual meeting shall be fixed at least six months before the *day* for the annual meeting by *the Executive Committee* acting jointly with *the Executive Committee* of the American Railway Master Mechanics' Association.

QUORUM.

IV. No change suggested.

ORDER OF BUSINESS.

V. The business of the meetings of the Association shall, unless otherwise ordered by a vote, proceed in the following order:

1. Reading of the minutes of the last meeting.
2. Address of the President.
3. Report of Secretary and Treasurer.
4. Assessment and announcement of annual dues.
5. Appointment of committee on resolutions, etc.
6. Election of auditing committee.
7. Unfinished business.
8. New business.
9. Reports of committees.
10. Reading and discussing questions propounded by members.
11. Routine and miscellaneous business.
12. Election of officers.
13. Adjournment.

VI. No change suggested.

VII. No change suggested.

VIII. No change suggested.

IX. No change suggested.

X. No change suggested.

XI. No change suggested.

XII. No change suggested.

REPORTS.

XIII. The report of the Committee on Nominations and of all standing and special committees must be in the office of the Secretary not later than April 1, in order that the same can be printed and advance copies issued by May 1.

XIV. Committee reports which do not reach the Secretary in time for printing and issuing by May 1, will be referred to the Executive Committee to decide whether the report shall be submitted to the convention.

XV. The chairman of standing and special committees will read an abstract of the report of the committee before the convention, together with whatever additional data may have been accumulated after April 1, to the date of the convention.

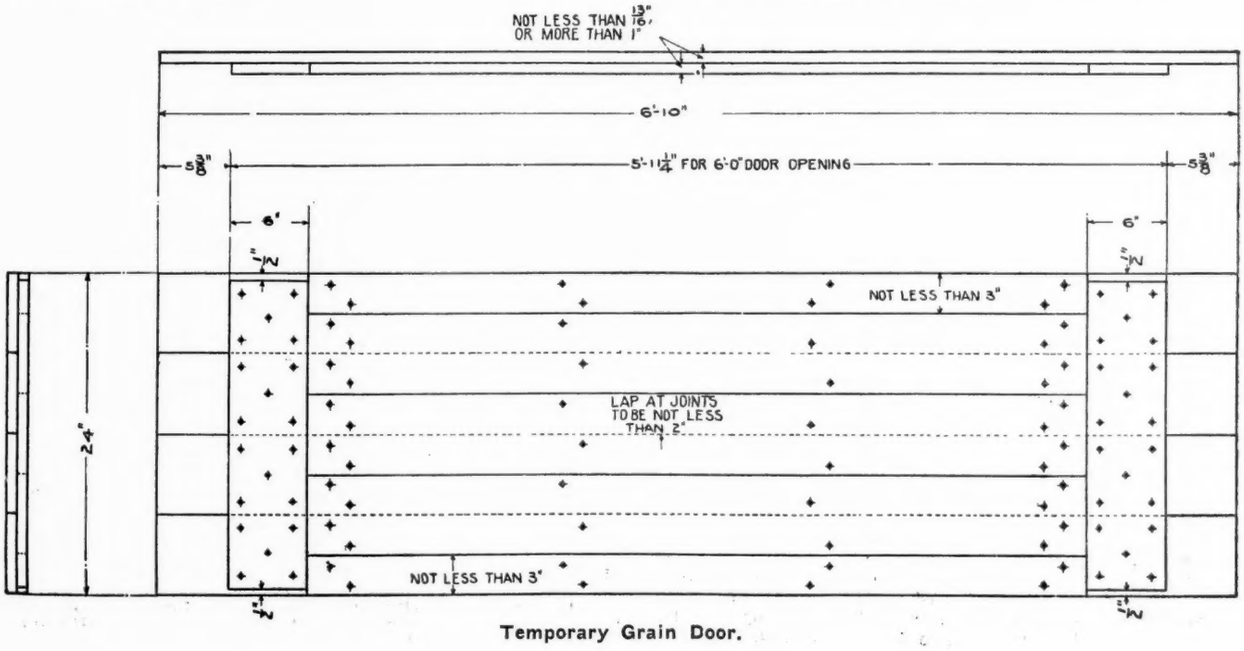
XVI. The members of standing or special committees who may individually or collectively submit a minority report, must prepare the same so that it can be issued with the report of the majority of the committee, to substitute for the majority report in the event the convention should so decide.

XVII. Each member of a standing or special committee must sign either the majority or a minority report.

BOX-CAR DOORS AND FIXTURES.*

At the 1908 convention this committee was continued to consider suggestions made during the discussion of the report offered at that time. The committee has revised its drawing for M. C. B. Sheet F to meet the criticisms offered.

*Report presented at the annual convention of the Master Car Builders' Association. Committee: C. S. Morse (chairman), J. P. Young, G. N. Dow, J. A. McRae, C. F. Thiele.



Temporary Grain Door.

It will be noted that the door-hanger bolt holes have been given definite location and the door-hanger bolts have been increased from ⅜ inch to ½ inch in diameter.

In place of the door guide plate there has been substituted a Z-bar which stiffens the lower part of the door and renders unnecessary the use of the lower angle-iron stiffener recommended last year. By the use of this Z-bar a shorter door-guide bracket is obtained.

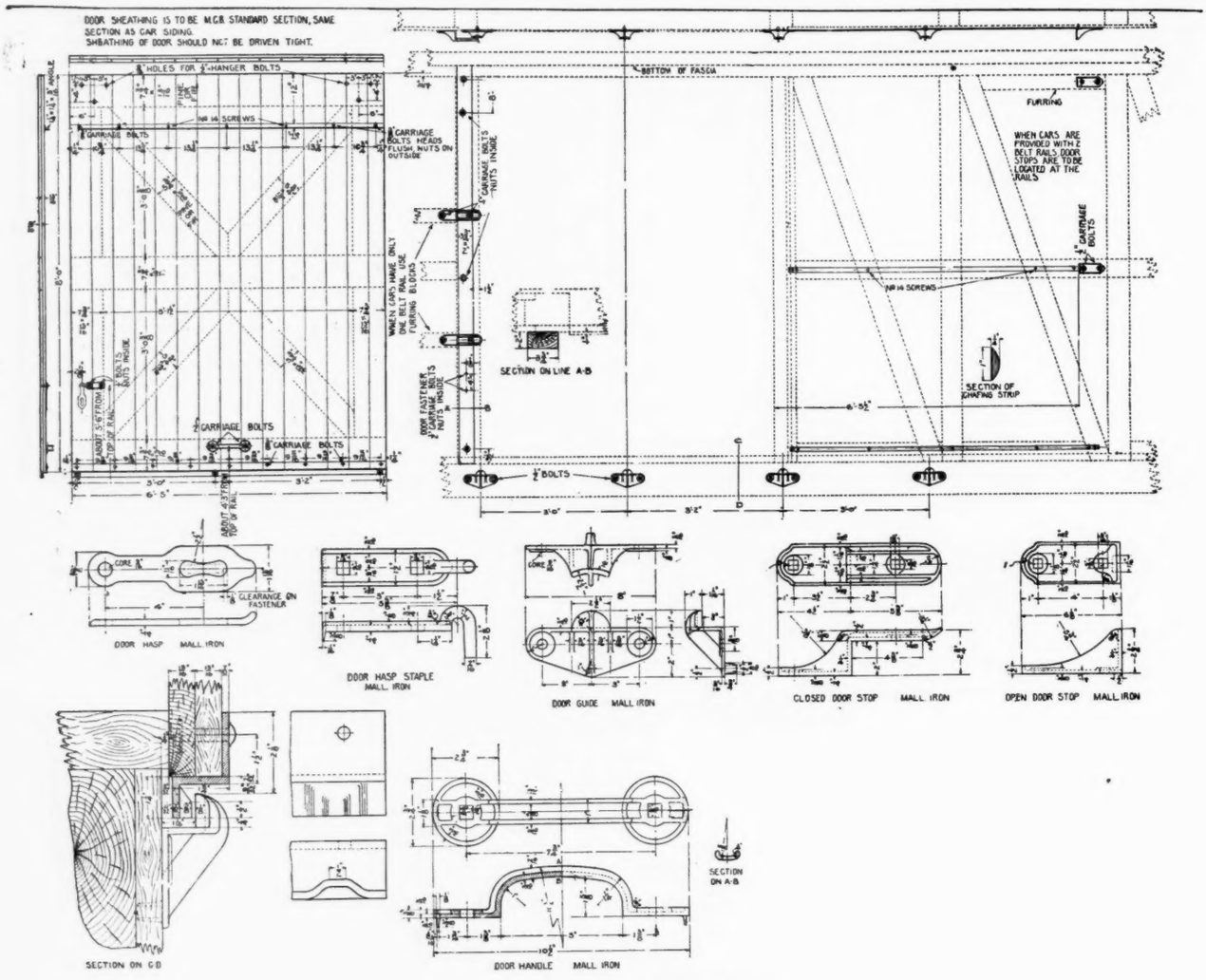
The bolts securing the door handle have been increased from ⅜ inch to ½ inch and lugs have been added, rendering the two screws unnecessary.

The door hasp staple bolts have been increased in size from ⅜ inch to ½ inch, but the committee did not consider it advisable to increase the number of bolts.

Since the last convention the Executive committee has requested this committee to consider also the subject of grain doors for box cars. Replies to the circular of inquiry indicate that the members are almost unanimously in favor of temporary grain doors. The committee has made a careful study of the various designs of temporary grain doors submitted and has prepared a drawing which would seem to be satisfactory from standpoints of price and efficiency. It would recommend specifications for grain doors as follows:

Temporary grain doors for box cars shall be made of two courses of lumber laid lengthwise with two end strips 23 inches long and 6 inches wide, one strip at each end of the short course. Lumber of any suitable wood may be used. The lumebr may have loose or unsound knots, exeept at the ends of the long course, but it must be free from rot or shakes that would prevent the nails from holding securely. The lumber in each door must be of uniform thickness and must be not more than one (1) inch or less than thirteen-sixteenths (13/16) inch thick and may be of any width—three inches or over—but each longitudinal joint shall be covered by a board that extends not less than two inches on each side of the joint. The short course must be nailed to the long course with four rows of clinch nails in a row and each end strip with twenty nails, all staggered and spaced as shown on drawing, driven home and properly clinched; where the width of the lumber used makes them necessary, a greater number of nails must be used to secure a strong and workmanlike job. The door, when completed, must be grain tight, with no holes or cracks extending through the door; also top and bottom edges of the door must be straight. Clinch nails must not be less than 2¼ inches in length.

In order to identify the ownership of temporary grain doors and to aid in their return, the doors should be stenciled with the owners' initials. The present cost of grain doors is a very considerable item and a large saving would be made if the doors were returned to the owners.


DOOR SHEATHING IS TO BE M.C.B. STANDARD SECTION, SAME SECTION AS CAR SIDING.
SHEATHING OF DOOR SHOULD NOT BE DRIVEN TIGHT.
HOLES FOR ¾" HANGER BOLTS
BOTTOM OF FASCIA
FURRING
WHEN CARS ARE PROVIDED WITH Z BELT RAILS DOOR STOPS ARE TO BE LOCATED AT THE RAILS
NO 14 SCREWS
CARRIAGE BOLTS
SECTION ON LINE A-B
SECTION OF CHAFING STRIP
½ BOLTS
DOOR HASP MALL IRON
DOOR HASP STAPLE MALL IRON
DOOR GUIDE MALL IRON
CLOSED DOOR STOP MALL IRON
OPEN DOOR STOP MALL IRON
SECTION ON G-D
SECTION ON A-B
DOOR HANDLE MALL IRON

Box Car Door and Fastenings.

FREIGHT CAR TRUCKS.*

The dimensions for the four dust guards recommended, representing boxes for 3¾ by 7-inch journals, 4¼ by 8-inch journals, 5 by 9-inch journals, and 5½ by 10-inch journals, are shown on accompanying Sheet No. 1, and it is suggested that they be added to M. C. B. Sheets 1, 4, 13 and C, as shown in the Proceedings for 1908.

There is no recommendation for material from which standard dust guards should be made, it being the opinion of the committee that there are a great many different materials proper for this purpose.

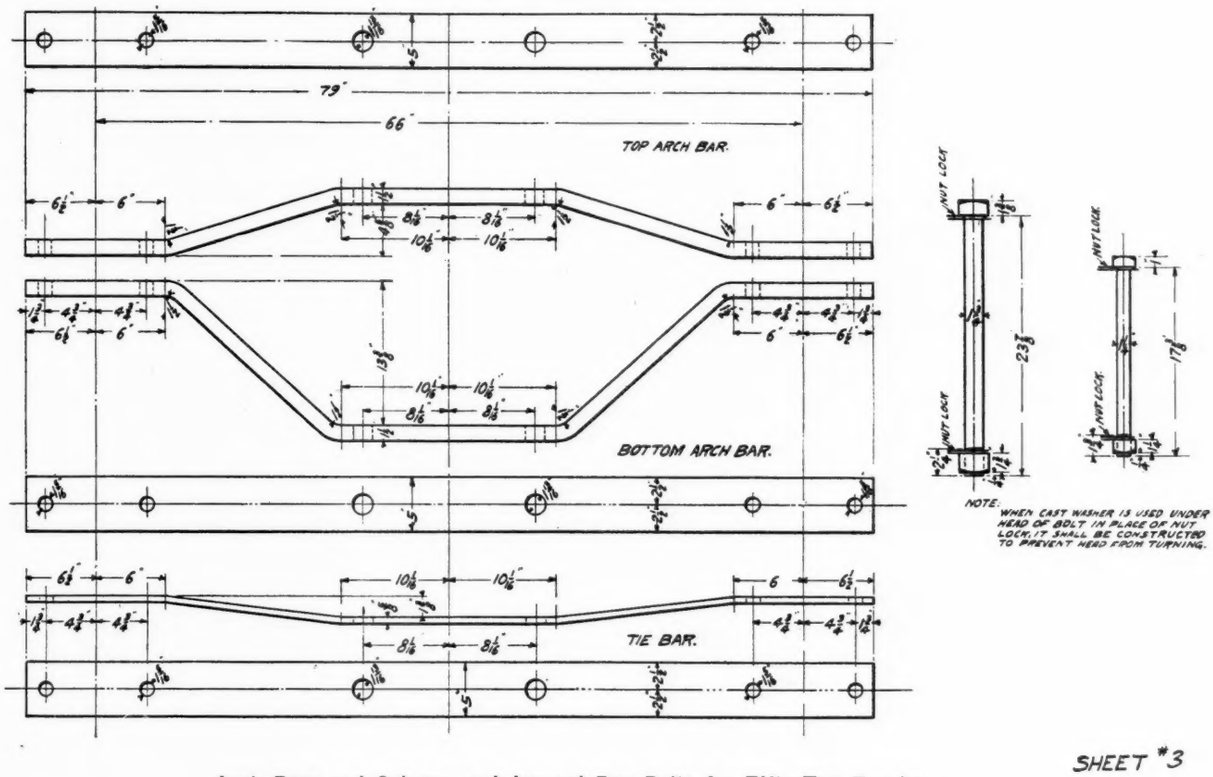
The accompanying drawing of journal-box bolt, with dimensions, is recommended for addition to Sheet M. C. B. 22. A single nut with nut-lock under head and nut of bolt, is shown

*Abstract of a report presented at the annual convention of the Master Car Builders' Association. Committee: A. Stewart (Chairman), J. J. Tatum, A. S. Vogt, J. F. De Voy, G. A. Hancock.

on the same drawing, as is also a nut-lock under head of column bolt on which single nut with nut-lock is used, where washer is used under head in place of nut-lock, the same to be constructed to prevent head from turning.

On this and another drawing are shown the column and journal-box bolts for both 80,000 and 100,000 lbs. trucks, with specifications to cover a suitable nut lock at the top and bottom of these column and journal-box bolts, and a further notation which is to be used in connection with this report in recommending that the practice be discontinued of double-nutting column and journal-box bolts on trucks of every capacity.

PROPOSED STANDARD ARCH BARS AND COLUMN AND JOURNAL BOX BOLTS, FOR 100,000 LBS. CAPACITY FREIGHT TRUCKS.


79"
66"
TOP ARCH BAR.
BOTTOM ARCH BAR.
TIE BAR.
NUT LOCK
NOTE: NUT LOCK TO BE USED UNDER HEAD AND NUT OF COLUMN AND JOURNAL BOX BOLTS AND DOUBLE NUTTING OF SAME TO BE DISCONTINUED ON TRUCKS OF EVERY CAPACITY.
NOTE: WHEN CAST WASHER IS USED UNDER HEAD OF BOLT IN PLACE OF NUT LOCK, IT SHALL BE CONSTRUCTED TO PREVENT HEAD FROM TURNING.

SHEET #3

Arch Bars and Column and Journal Box Bolts for Fifty-Ton Trucks.

Standard designs for arch bars and column and journal-box bolts for 100,000 lbs. capacity trucks are submitted, as shown herewith.

In suggesting this design of arch bar, it has been largely based on the reports of satisfactory performance of cars now in service, of 100,000 lbs. capacity. The average area of the top and bottom arch bars of all the 100,000 lbs. capacity trucks we could get a record of is 7½ inches, and the majority have both the top and bottom arch bars of the same dimension, or 5 by 1½ inches, with a cross section area of 7½ inches. The good performance of these trucks justifies the recommendation of this design of bar for Recommended Practice.

The committee was instructed to ascertain whether there is any necessity for higher spring capacity for 100,000 lbs. capacity trucks. All of the replies received, except one, indicate that 10 per cent. overload is the universal practice. The average 100,000 lbs. capacity car will weigh 40,000 lbs., and the standard Class D spring is designed to carry 38,000 lbs. at a height of 7¼ inches and 64,000 lbs. when solid, making the normal working capacity 152,000 lbs., which is also the capacity of the 100,000 lbs. or D axle, having journals 5½ by 10 inches.

It is the suggestion of a number of roads to increase the spring capacity, but the committee was divided on this, two members advocating an increase in the spring capacity to allow for an overload of 25 per cent., the other three members taking the view that as the present spring has a capacity equal to the designed capacity of the truck and axle, a greater capacity should not be recommended unless taken up in connection with a larger axle and increased capacity of truck.

The following subjects were referred to the committee by the chairman of the Committee on Standards and Recommended Practice:

Sheet M. C. B. 22.—"Change drawings to show single nut with lock washer, or nut-lock, eliminating the use of second nut and cotter on column bolt." This subject, being covered under the instructions to the Committee on Freight Car Trucks, has been included in its regular report.

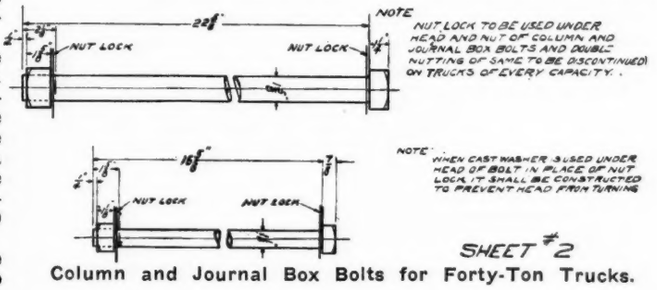
The vertical clearance between the side lugs on the journal bearing and the journal wedges is ⅛-inch for 3¾ by 7-inch and 5½ by 10-inch journals, and 1/16-inch for 4¼ by 8-inch and 5 by 9-inch journals.

In the opinion of the committee, 1/16-inch is too small a clearance, taking into consideration that the parts are rough castings, and it recommends that the clearance be increased to ⅛ inch for the four standard sizes of bearings and 1/16-inch reduction be made in the brass for the 4¼ by 8-inch and 5 by 8-inch boxes, as shown on Sheets M. C. B. 6 and 15, the correction being shown on attached Sheet No. 4.

There is no dimension given for a standard depth of hood of M. C. B. Standard journal-box lid.

The committee feels that, provided the lug on the journal box is maintained standard, it will be better not to limit the manufacturers in the design of their box lids, provided they properly fit the standard lug.

Attention is called to the opening in the back of the box for 5 by 9-inch and 5½ by 10-inch journals.


22⅝"
NUT LOCK
NUT LOCK
NOTE: NUT LOCK TO BE USED UNDER HEAD AND NUT OF COLUMN AND JOURNAL BOX BOLTS AND DOUBLE NUTTING OF SAME TO BE DISCONTINUED ON TRUCKS OF EVERY CAPACITY.
16⅝"
NUT LOCK
NUT LOCK
NOTE: WHEN CAST WASHER IS USED UNDER HEAD OF BOLT IN PLACE OF NUT LOCK, IT SHALL BE CONSTRUCTED TO PREVENT HEAD FROM TURNING.

SHEET #2

Column and Journal Box Bolts for Forty-Ton Trucks.

It is recommended to change M. C. B. Sheet 14, showing 5 by 9-inch journal box, and this recommendation is concurred in by the committee, which suggests that the dust-guard opening and back of the 5 by 9-inch box for freight cars be made similar to the 5 by 9-inch box for passenger cars, as shown on M. C. B. Sheet C. Consideration has also been given the 2½ by 10-inch box as shown on M. C. B. Sheet 17, but the committee has no changes to recommend.

TOPICAL DISCUSSIONS.

The application of suitable lugs to steel and steel underframe cars for jacking up of car bodies, and application of suitable push-pole pockets to avoid damage to cars.

T. A. Paxton (E. P. & S. W.)—The application of jacking lugs to steel and steel underframe cars is a matter of detail looking toward the convenience of handling those classes of cars on the repair tracks only (wrecks excepted), as the lugs add nothing to the car's strength, symmetry or carrying capacity. While there are numbers of cars on which jacking lugs would not be necessary, as the jack placed under the side sills at the bolster has ample room to clear the journal boxes, steel underframe box, stock or other house cars; flat and gondola cars having the stake pockets placed on the outer faces of side sills; narrow bodied, all-steel gondolas and special service cars, however, are especially hard to handle on the repair tracks, when it is necessary to jack them up to remove the trucks for any purpose. The all-steel car is so nearly indestructible as a whole that we seem to have overlooked the fact that certain of its parts, such as wheels, axles, arch bars, journal boxes, center plates, etc., require quite as frequent repairs or renewals as the older forms of wood construction. Cars having fish-bellied side sills are especially difficult to jack up, if loaded, and with this class of car it is usual to do the jacking in two operations, the first with the jacks under the end sill.

In order to ascertain the practice in different parts of the country a circular of inquiry was addressed to a number of the roads operating steel and steel underframed cars. The following questions were asked, viz.:

(1) Are lugs for jacking up car bodies to facilitate the removal of the trucks standard to your steel and steel underframed cars?

(2 Do you consider these lugs necessary?

(3) Have you applied, or are you now applying, these lugs to old equipment, where such were not embodied in the original construction?

(4 Do you prefer lugs of malleable iron, cast steel or pressed steel?

(5) What is the average cast per car for applying these lugs (a) to new equipment; (b) to old equipment?

(6) Do you consider the expense of applying lugs to old equipment justified?

(7) What area of base do you consider necessary?

(8) Have you placed these lugs at any other points along the side sills than at the bolsters?

(9) Do you prefer a rectangular base on lug?

(10) Please furnish prints of your standard lugs.

The above inquiry was sent to but a few roads. The responses were prompt, though inconclusive, and show a lack of uniformity as regards the practice of applying jacking lugs.

From roads operating a hundred thousand steel cars the replies indicate that views are about equally divided as to whether these lugs are necessary. Where the lugs are standard they have usually been applied when cars were built, and but very little data can be obtained as to the cost of same, but it will probably amount to between $8 and $10 per car.

There is also great diversity of opinion regarding the proper area for the base of lug, same varying from 36 to 96 sq. in. The design of car would influence the area of lug somewhat.

An inspection of steel and steel underframe cars without jacking lugs will show that in many cases the lower flanges of the side sills are badly distorted, and this damage seems to be greater with the pressed than with the rolled sections. If the car is wide enough for the jack to clear the tracks, there are many cases where a reinforcing plate would be an advantage. On some roads it is the practice to combine the features of a jacking lug and roping iron in one casting, which may possibly be one of the best forms. It is understood this design is patented.

The practice of the car builders is not to provide jacking lugs, unless specified by the purchaser, although the cost of applying them at time cars were built would add very little to the cost of the car. There are a number of special service cars (ore cars and the like) on which the journal box projects beyond the side sills.

Prints showing the relative positions of journal box and side sills, for a number of different classes of cars, are submitted as follows:

X-40	100,000	lbs.	capacity	box car.....	Lugs are necessary
X-41	"	"	"	ore car	" " "
X-42	"	"	"	ore car	" " "
X-43	"	"	"	gondola	No lugs required
X-44	"	"	"	coke car	" " "
X-45	80,000	"	"	oil car	" " "
X-46	"	"	"	gondola	" " "
X-47	60,000	"	"	stock car	" " "
X-48	100,000	"	"	flat car	Lugs are necessary
X-49	"	"	"	flat car	Application of lug to X-48
X-50	"	"	"	ore car	Lugs are necessary

These prints represent only a few of the many designs of car underframing, but they indicate in a measure what may be encountered almost daily on any railroad repair track. In many cases where no lugs are required, it would be advisable to provide some stiffening for the lower flanges of the side sills. It would appear that cast steel has the preference for material for the lugs, though for some designs of cars pressed steel would offer advantages. No one design of lug could be made applicable to all classes of cars, yet there should be some limiting dimensions, and approved methods of attachment to bodies. The general practice of those companies using jacking lugs is to locate them at the bolsters.

For all future construction of steel or steel underframe cars it would seem desirable to require that jacking lugs be placed at the bolsters, or the idea of extending the lower member of the bolster to such a distance beyond the side sills as would provide a suitable resting place for the jack head might be usefully employed, so that the trucks may be removed without having to reset the jack; that the lugs may be of any suitable material, preferably of cast steel; that the dimensions of the base may be of any desired shape, but of an area not less than 50 sq. in.

Suitable Push-Pole Pockets.

A circular of inquiry was also sent to a number of railroads using steel and steel underframe cars, as follows:

(1) Do you apply push-pole pockets to steel and steel underframe cars to (a) old equipment, and (b) to new equipment?

(2) Do you have end sills damaged by poling, or by bumping cars into clear, by cornering with other cars, when push-pole pockets are not provided or are of improper design?

(3) Do you prefer pockets of malleable iron, cast steel, or pressed steel?

(4) Have you found the ordinary methods of diagonal bracing able to withstand the stresses set up by poling?

(5) Do you consider a push-pole pocket riveted to the end sill better than a depression made in the face of the end sill itself, and, if so, why?

(6) Is it your practice to plash push-pole pockets as close to the corners of the car as possible?

(7) Please furnish prints of your standard push-pole pockets.

The replies to the above questions indicate that it is the general practice to (1) apply push-pole pockets to steel and steel underframe cars, (2) there seems to be a general trouble of having end sills damaged even when push-pole pockets are provided, and still greater damage, when pockets are not provided; (3) the preference is for pockets made of malleable cast iron, though a number prefer pressed or cast steel; (4) the bracing has generally proven satisfactory; (5) the choice for pockets riveted to end sills (generally forming the connection between end and side sills) seems to be universal, the depression in end sills being of insufficient depth and strength; (6) it is also the prevailing custom to place pockets directly at the corners; (7) the general design of push-pole pocket has a more or less spherical depression, varying from 1¼ to 2 in. in depth, and from 4½ to 6½ in. in diameter. This depression is made at various angles to the end and side sills. While most steel and steel underframe cars are equipped with push-pole pockets, there are a large number that have "push-plates" which are only a poor substitute, and while all cars should have them, it would seem desirable for all future construction to have a standard depth and diameter, whatever the method of attachment may be.

The above discussion was read by the Secretary, Mr. Paxton being absent.

F. W. Brazier (N. Y. Central).—I hope some of the linesmen will feel free to get up here and give their opinions on this subject. I certainly have had my attention called a great many times to the advisability of providing some way to jack up these heavy capacity steel cars, especially of the pressed-steel type.

J. F. De Voy (C., M. & St. P.).—It is altogether probable that a jacking iron or push-hole pocket is desirable. So far as I have been able to discover it is almost an impossibility from a commercial standpoint to provide the proper strength in either that portion directly adjacent to the push-hole pocket or the jacking iron to justify the expense of the same. I

refer particularly now to a steel underframe under a box car. If you apply a jacking iron at or near the bolster, as a general proposition the side sill, whatever form it may be, either in a channel, Z-bar or other construction, has to be reinforced if you are to obtain any results. I doubt, as I said, whether it is possible from a commercial standpoint to design a car with the underframe construction to withstand such appliances. It is no doubt true that they are desirable. In nine cases out of ten that I have observed the push-hole pocket, whether it is malleable iron or pressed into the steel-end sill, is not used. In a poling yard I have noticed that invariably the pole is put directly on the end corner of the car. In such cases, nine times out of ten, the construction is adsolutely inadequate to meet the requirements or to meet the stress that is put on it. The whole question, in my mind, resolves itself into whether it will pay to provide additional so-called needle beams, gusset plates or other construction to withstand it. That seems to be the whole thing. There is no question but that it is desirable.

Wheel Defects. Is a brake burn due to prolonged brake application properly an owner's defect? How is it to be distinguished from the defect known as shelled out?

H. D. Taylor (P. & R.)—I think we should begin the discussion by saying "is not the defect properly an owner's defect?" In the first place, all wheels are made to carry their load. Any wheel in legitimate service that cannot carry its load is defective. The defect known as shelled out is simply a foundryman's defect in the manufacture of the wheel. The defect known as slid flat is simply from the improper application of the brake, generally on grades. In between that we have what is known as a brake burn. The shelled out defect is very easily distinguished. The metal shells out, and the appearance underneath is very much like an oyster shell. It will be high in the center, and the metal perfectly clean and hard. You all know the appearance of a slid flat. It simply slides along and leaves flat spots with radiating cracks. Now, in the brake burning due to continuous application of the brake on down grades, we have neither of these conditions.

Tests have been made recently on one of the prominent eastern lines in which a 100,000-lb. car was loaded with 110,000 lbs. of scrap, making a total weight of 150,000 lbs. of load. The wheels put under this car were all of one manufacture, and all presumably as good as could be put into service for this test. The car was taken out and pulled down a mountain grade of about 4 per cent. for 12 miles, and the test was repeated four times. The wheels at the end of the test were still round and had no flat spots, but the surface was cracked from the application of the brakes, checks running out radiating in all directions, and in two places the plates were cracked. If under ordinary conditions these wheels continued in service, they would, if not immediately detected, in a short space of time begin to shell out, and then there would be a controversy as to who was responsible for the trouble. As a matter of fact, such wheels would run but a very short time before they would pound out in spots. The appearance of the wheel would not be like the ordinary shelled out wheel, and yet it would not have the appearance of an ordinary slid flat wheel. I would like to place the responsibility for such wheels on the manufacturer or the car owner.

In making these tests the brakes were set first by hand, with a lever about 4 ft. long, hard enough, so that they would just not slide, simply revolve. Afterward the air-brake was used, but in neither case was there a slid flat wheel. They were constantly watched. We are all having more or less trouble in our interchange in this subject, and particularly with the owners of private car lines. They are accusing us continually of charging them for wheels which have not owner's defects. We think that the brake burn is an owner's defect, inasmuch as the wheel should stand up in service.

The condition is more marked, of course, with some makes of cast-iron wheels than others. The steel wheel will stand up in service and a high-grade cast-iron wheel will stand up, but the ordinary run of wheels falls down very fast. Tests were made of special cast-iron wheels, as compared with the ordinary wheel which we were buying. In a year and a half not a single one of the special cast iron wheels has been removed, but they are removing the ordinary wheels by wholesale all the time in absolutely the same service. I have some photographs here showing the condition of these wheels after the tests had been made.

R. P. C. Sanderson (Virginian)—Mr. Taylor, as you have gone into this matter as thoroughly as this, I ask if you have done anything toward making a chemical analysis of the iron to enable us to tell whether certain combinations of iron are more or less subject to this cracking. You stated a while ago, which was entirely right, that certain makes of wheels would give long service and others would fall down very fast. In other words, the wheels that were made to sell—the ordinary run of wheels which we buy in the market—failed, while a wheel made in a painstaking manner, with good foundry practice, will stand. I would ask what constitutes good iron for a wheel in order to get the service which we desire? We have had a lot of discussion with the wheel manufacturers about tying them up with chemical specifications, the same as we do with regard to rails and billets, etc. Have you made any progress in this connection of making analyses of irons of which the wheels are manufactured, so as to be able to say what combination of materials will produce the best wheels?

Mr. Taylor—The tests have not yet been made. The tests have just been completed and there has been no time to make any analyses. The special wheels were made of Norway and Sweden and Salisbury iron, high-grade iron.

William McIntosh (C. of N. J.).—I did not understand whether Mr. Taylor has continued the wheels in service after he had discovered that there was a bad surface produced by the breaking effects that he told us about. It would be, I think, very important if that had been done.

Mr. Taylor—They have been put in service and have been watched right along to see how long they will remain in service before shelling out.

Mr. McIntosh—You have not discovered the shelling yet?

Mr. Taylor—The test was only started this past week.

W. E. Sharp (Armour Car Lines)—I understood Mr. Taylor to say that all of these wheels were selected for the test, and it was discovered that the common gray iron wheel would fail rapidly, while the special wheel would stand the service. I ask if he has any information to give the members at this time as to what this special wheel is. Is it a wheel in general use and on the market, or was it a wheel specially made for the test?

Mr. Taylor—They were not made for the test at all. I spoke in a general way of special wheels in service for a year and a half not failing, not one failing out of several thousand. The wheels tested were simply A No. 1 selected wheels that are in ordinary use, a cast iron wheel, 700-lb. wheel, but they were selected as being good wheels and perfect in every way.

T. H. Curtis (L. & N.)—I would like to confirm what Mr. Taylor has said, by relating a circumstance that came to my notice. A wreck was caused on a certain railway by the breaking of a wheel flange, about three-quarters of it being broken off. The matter was taken up in the presence of the wheel makers and they said that the flange of the wheel was made defective by brake burns. This wheel showed large discolored portions where cracks were. We then examined the quarter of the flange that still remained and it showed a few surface cracks. We examined the opposite wheel which was mounted on the same axle. This wheel surely made the same mileage and was operated under the same braking conditions. It was made by the same manufacturer and in the same month, and the flanges on both wheels were full, not worn to any extent. We broke the remaining quarter of the flange on the wheel that was said to have caused the wreck, and we found it to be discolored and having so-called brake burns. After breaking the other wheel, on the opposite side of the axle in small pieces, we found there was not a defect and no brake burn in that wheel. Following up this line, we suggested that certain kinds of metal brake burn, while others do not. I have made several investigations of broken flanges, and three times have I found that the wheel on the opposite side did not have the so-called brake burns. This leads me to believe that the liability to brake burn is in the casting, or the material used, and that it can be eliminated if we know the proper kind of material to use in our wheels.

A. W. Gibbs (Penn.)—I would correct Mr. Taylor a trifle, as I was instrumental in having this test made. The results of the test show that nearly all of the wheels have cracked plates to a dangerous extent, so that the subsequent running tests have to be made on a special track, as it would be unsafe to continue the wheels and cars in regular service.

The whole thing about the matter is that we are being accused of bad faith in withdrawing wheels which, for want of some better term, are called shelled out. I do not understand that brake burn is a common car builder's defect, but all of us will sooner or later have these charges brought against us because we may do the original damage on our road. We are testing the wheels now to find out how soon after brake burn the pieces drop out of the wheels. You send a bill to the car owner for the replacing of the defective wheel, and he will disclaim his responsibility for the damage. He will claim that they were either brake burned or brake slid, and hold that he is not responsible for the damage.

I think we should fix now the question whether it is an owner's defect or not. If it is incident to the wheel, so much the worse for the wheel, but it will stimulate the demand for something better.

William McIntosh—Were these wheels submitted to thermal treatment?

Mr. Taylor—Not at all.

A. E. Manchester (C., M. & St. P.)—I have often observed the condition already referred to, of one wheel showing the burn and the other wheel showing no indications of trouble. I think it is a corresponding condition to the one that we experienced where one wheel wears out much more rapidly than the other and runs toward the flange. I think the greatest problem we have before us to-day in getting the best mileage out of wheels is to know how to make wheels good, absolutely of the same hardness. They may have the same mixture, and be molded by the same men, but if a slight difference in temperatures, or some of the other 97 defects that the manufacturer claims arise in the manufacture of a wheel, creeps in there, we get two wheels of unequal hardness mated together. I believe this question has much to do with that feature of one wheel showing up poorly and the other standing up well, under exactly the same conditions.

F. H. Stark (Pittsburg Coal Co.)—I agree with what Mr. Manchester has said, and I believe that Mr. Curtis' experience is an exception rather than the rule. While it is true that we get occasionally a case where a flange fails, where there is no perceptible flange wear, that is a rare case. If our chief joint inspectors here would get up and express themselves I believe they would confirm the fact that in 90 cases out of 100 flange failures occur where the flange shows wear. There are a number of elements that enter into the case. First, in the increased braking power at the present time and the increased car loads. We find that a large majority of the flange failures occur under 100,000-lbs. capacity cars, and then, too, largely in the hopper cars. We do not have very many failures under cars of 80,000 lbs. or less. You have the increased braking power, the increased load, which creates a greater pressure between the flange and the rail, which causes heat. You have, too, the effect of the rail joints. If you have a pressure against the flange constantly, and subject it to constant pounding of rail joints, it will cause separation of the metal. While you may have a case where one wheel fails with a full bearing, such occurrences are rare. The question of side bearings enters into it also. If the car truck does not ride properly you have increased pressure against the rail. I know of wheels made by the same manufacturer and placed under cars with metal truck bolsters and the flange failures were but very few.

Mr. Schroyer—This is not a question of flange failure, but a question of brake burning.

Mr. Stark—Flange failure is caused by these brake burns, and causes the seam next to the throat of the flange. The average shelled out wheel is from a different cause.

The Secretary—Mr. Gibbs submits this sample and asks whether this is a brake burn or an owner's defect. (A number of samples of a broken wheel were then exhibited to the members for their inspection.)

D. F. Crawford (Penna.)—I would move that we refer this question to the Arbitration Committee to be considered at its meeting this afternoon, and to have a recommendation made to the association when the committee makes its regular report to-morrow morning.

Motion carried.

The President—Mr. Gibbs would like an informal vote on the question whether these are brake burns or not. I will put the motion in this way: Is that a brake burn (pointing to the piece of broken car wheel)?

E. T. Millar (B. & M.)—I looked at the piece of cast iron, and I looked at the depth of the chill. In my opinion it has a good deal to do with the condition of the wheel as to the state of the iron when it is poured; that is, whether the iron was slack or not. In my opinion the iron was slack when that wheel was manufactured. It was on account of the slackness of the iron at the time the metal was poured that the burn occurred.

F. W. Brazier (N. Y. C.)—I was brought up to believe that brake burns were owner's defects. We have had considerable trouble in settling with wheel manufacturers on our guarantees on account of the difference of opinion as to whether a wheel shelled out was caused by poor material or caused by a brake burn. I am of the opinon that wheels should be made of good material in order to withstand the so-called brake burn. The manufacturers should make the wheels sufficiently good.

Mr. Manchester—We will have to vote, I believe, that it is a brake burn, but I do not believe that should influence the question as to whether it is a manufacturer's defect or not.

The President—Not at all.

Mr. Manchester—If it was made of the proper material it perhaps would not have burned.

E. W. Pratt (C. & N. W.)—I do not believe there will be anything gained by taking a vote on this subject, and I move that the motion be laid on the table.

Motion carried.

Mr. Gibbs—May I ask that the Arbitration Committee make a ruling as to what is considered a brake burn? It is not a Master Car Builders' term. It is a common term we all use, but I do not think there is any special authority for it. I think the committee should describe in some way what this thing is, and then state whether it is an owner's defect or not.

The President—That matter has been referred to the Arbitration Committee and it will bring in its recommendation in connection with it to-morrow.

TOPICAL DISCUSSIONS.

Abuse of the M. C. B. Repair Card.

W. H. Lewis (N. A. W.)—The repair card unfortunately makes possible the misuse which there can be no doubt is often indulged in. Prominent railways quite frequently render bills for defects which seem unreasonable on their face. It seems very evident that unfair advantage is often taken in the preparation of bills, and always in favor of the road presenting them. It is quite impossible to comprehend the extent of this practice as well as the volume of the bills often rendered for a particular line of work, which apparently has been picked out as a specialty. They come from roads least suspected. Some of the bills seem so inconsistent and so unreasonable that one would hesitate to mention it to the higher officials.

Persistent and honest efforts have been made, but in vain. The only way it can be corrected and made fair to all concerned is by the abolition of the owner's defects, at least to the extent of reverting to the practice which was in vogue prior to 1893. The question might introduce some phases of the private line exchange, but that side of the question will have to be worked out so that it will be fair and equitable to all concerned, and it may possibly mean a revision of the rule permitting private lines to be handled on a somewhat different basis. One of the technical magazines, recently, in commenting upon the frequent misuse of the defect card, concluded by suggesting that a committee composed of representatives from different roads be appointed to visit yards throughout the country and check their methods and practices, but this we hardly think would produce the desired results for the reason that they would soon be known and the knowledge of their presence would be sufficient to defeat the object.

To better illustrate, I have taken the opportunity to pick out a few such bills as representative of those that have attracted attention. Of these items, all were taken from current bills without making any attempt to compile special data, but to gather up some of those in the course of preparation for voucher.

One road renders three bills covering three different months. These bills happened to reach the desk at the same time, due to various questions having come up for adjustment.

Bill No. 1 amounted to $281.43. In this bill is found 22 charges for air brakes cleaned at one station.

Bill No. 2 amounted to $233.66. This bill contained 19 charges for cylinder and triple valve cleaned at one station.

Bill No. 3 amounted to $224.08. This bill contained 46 charges for cylinder and triple valves cleaned at one station.

Another road presents a bill for $6,186.40. This bill contained charges for 490 air hose applied. All this work, as alleged, was performed at one station in approximately 1½ months time. This, indeed, raises some question, as the number of hose reported as having been applied represented a very large percentage of the total number that were applied on the system, still the road making the bill handles only a small proportion of the equipment in interchange.

Another road presents a bill amounting to $368. In charges made against 98 cars find 11 couplers, 29 knuckles, 23 knuckle pins, 15 knuckle locks renewed on account of being found broken.

Another road presents a bill amounting to $409.65. This bill enumerates 60 cars, of which 48 received 119 brake shoes. All of those brake shoes were applied in a little less than 30 days.

Another road presents a bill amounting to $72.62. This bill enumerates 60 cars, of which 40 are charged with a total of 5 couplers, 4 knuckles, 3 knuckle locks, 29 lock pins and 22 knuckle pins, all applied at one station. The bill covers a period of approximately 1½ months.

Another road presents a bill amounting to $878.25. In this bill is found 35 cars receiving repairs of a period of one month. Of these cars 25 received 32 brasses at one shop.

Another road presents a bill amounting to $2,728.40. This bill contains charges for 257 air hose, alleged to have been

applied on account of old ones being torn and burst; 981 brake shoes being replaced on account of old ones being worn out. These two items alone amounted to $702.70, or over 25 per cent. of the entire bill.

Another road presents a bill amounting to $645.87. In this bill 139 cars were repaired at one station in a period of one month. The charges included 70 brake shoes being applied to 63 cars on account of old ones being worn out, 28 pairs of wheels applied to 26 cars. At another shop 86 cars were repaired, of which 10 received 10 pairs of wheels. In the same bill charges were made for 45 brasses applied on account of old ones being worn out. It will be noted that this one road alone in 30 days made 38 charges for 38 pairs of wheels, and it is work done at two of their shops, still this road handles but a small proportion of the equipment.

Another road presents a bill amounting to $86.09. This bill, while covering a period of but one month, shows 112 different cars repaired. To 86 of them are charged 72 brake shoes, 24 knuckle pins, on account of old ones being broken; 24 of the 72 shoes were applied at one shop. This road handles a very small proportion of the equipment, and is many miles distant, but at the same time the shop applying the 24 shoes must be very small, as renewing of brake shoes not only seems to be its specialty, but the extent of their work.

In a bill from another road several items were selected of more or less interest. One repair card shows the application of one air hose to A end of car, and two days later another air hose is applied to the same end of same car.

Another repair card shows the application of two new brake shoes at A and B end of a certain car; on the same date, two more brake shoes were applied at the same ends of the same car and by the same inspector.

Another card shows the application of two new standard air hose to a certain car and four days later another card is applied to same car for another air hose, which shows that one of the new standard air hose lasted but four days, which was not long enough to get the car off of their tracks.

Another card was applied for a new air hose to a certain car at A end. On the same day another hose was applied to the same end of the same car and by the same inspector. Here is a case where two new hose were applied to the same end of the same car on the same day and by the same inspector.

Another card shows the application of a new air hose to A end of a certain car end on the following day another air hose was applied to the same end of the same car. Here is another case where the air hose lasted less than a day and not long enough to get the car out of the yard and perhaps not off of the repair tracks.

Another road presents a bill for $408.42 and as curious as it may seem, as the shop where the repairs were alleged to have been made is over 1,000 miles distance, $159.89 of the bill is charged for coupler repairs affecting 158 cars. The average cost of repairs on this bill amounted to $2.58½ per car.

From another road two repair cards were picked up showing repairs to two cars. On the first car a new steel Climax coupler was mentioned as being applied at A end, but when card was received home it carried a Melrose at that end, which was standard to the car, and no evidence of the coupler having been removed. The other card, which was for the second car, showed one air hose applied at B end, but when the car was received it was found that evidently repairs had not been made, as the air hose at that end bore the stencil of another road, the date on the label showing that application had been made about two months prior to date of repair card in question.

There is no doubt but that a number of inspectors, perhaps not with the knowledge of the management, have been marking triple valves as cleaned without doing any other work to the valves whatever. To better illustrate: three cars were found on June 4, the cylinders and triple valves of which bore stencil marks indicating that they had been cleaned June, 1909, which meant that if the work had been done it had been taken care of during the previous three days. But these particular cars were discovered passing through a certain yard about 200 miles for the interchange point, hence it is reasonable to suppose if the work, if done at all, must have been taken care of on the 1st or the 2d of the month. The dates attracting attention, an examination was made developing the fact that not one of the valves had been touched, nor even had the nuts and gaskets been disturbed. As but three days had elapsed since the work could possibly have been done, according to the dates, there is no room for doubt but that the stenciling constituted all the work the triples received. Unfortunately this is not particularly unusual and represents what is often found to be the case.

Another case was found where a certain car arrived at a certain station with three flat wheels, measuring approximately 4 in. As the marks on the cylinders indicated that it had been cleaned that month, and it was then only the 9th day, directions were given for an examination of the cylinder and triple, which developed the fact that the cylinder and triple were very dirty, the conditions clearly indicating that they were as they would be expected to be had they run 10 or 12 months.

It is not at all unusual to find many different names of inspectors on repair cards at one station, which rather indicates that each inspector is supplied with a book and the application of cards is being carried on very extensively; in fact, it is an open secret, as has been reported by roaming repair men, letters of commendation have been issued at the end of the month for the greatest number of repair cards issued, which, if true, is not surprising or is the inspector largely responsible for a productive of the large volume of repair cards issued.

Another case of recent date is a certain car bearing a repair card from a certain road indicating that two 1½-in. truck-raising boards had been applied, one to each truck. The car was examined a few days later, as was shown by the repair card developing the fact that at A end there was a 1¼-in. raising piece on bolster, but it was very old and discolored to exactly the same color of the bolster itself, leaving the impression that it was perhaps applied at the date of application of bolster. The truck at B end had no raising board at all and the indications show that it never had one.

It is not at all unusual to find repair cards covering column and box nuts applied where the indications show no evidence of any disturbance of the bolt or any work having been done. The alleged application of box and column bolt nuts seems to be very general. These with other small jobs seem to have been done in the greatest quantity, but as it is so often very evident that the work is not done we cannot help believing that it is a sharp practice, and then if the work is done it is largely to make the shop forces self-sustaining.

Reading over another repair card from a certain road it appears that on May 5, 1909, the following repairs were made to a certain car:

1 S H 5x5 steel Tower coupler, complete....A end.
1 S H 5x5 Munton coupler, complete.....B end.
4 pocket rivets .....B end.
Reason for repairs—2 5x5 Major coupler bodies broken.

To find a coupler at one end of the car broken is not unusual; in fact, not questionable, but to find a card reporting two couplers broken, and they have failed in the body, it is quite uncommon for the particular coupler mentioned. It is rather difficult to understand how it could occur under fair usage; in fact, it is the rarest thing to find such conditions even as a result of a wreck. Still the report is made in this shape and certified to by the inspector.

Eugene Chamberlain (N. Y. Cent.)—We all have some troubles that are not purely imaginary, and a great many of these troubles are derived from rule 76. It will in no wise do to return to the period which existed before 1893 and say that ropes and wheels shall be owner's defects, and that sort of thing, for the reason that you would retard the movement of freight in this country to a degree that would simply be a distortion of the traffic. To charge dishonesty, without absolute proof, one would have no standing in any court and would be immediately ejected.

For high average of intelligence, integrity, and honesty, the railway men as a body have no peers. You all appreciate in the use of this repair card the difficulties when a train of 55 cars comes along and a German inspector equipped with rubber boots and woolen mittens makes out these cards and attaches them to the cars with his thumb. As a matter of fact, it is not generally done, but you are pretty sure to receive the stub and a bill accompanying it, which you pay, to save trouble in tracing up. It is going to be necessary, gentlemen, that everyone shall employ a sufficient number of men, clerical help, to absolutely comply with this rule.

This rule can be made absolutely efficient by a proper compliance with the rule. We must, gentlemen, as men of honor, protect the intermediate road, the road which did not make these wrong repairs. It is your duty and my duty to protect that road, and that must be done by indicating the road which actually made the repairs, and that may be done by this card if properly used. It is impossible for the Erie, or the Lackawanna, to go on to the B. & O. and discipline their men; it would not be thought of for a moment. But the B. & O. officials can discipline their own men. They can say to their men: You have no material interest in enlarging the bills of this company against any other company. We desire you to be absolutely honest, and unless you are honest we shall not require your services. Further than that, gentlemen, there should be no attempt to equalize your account against the other road. Some of us, unfortunately, own more ancient equipment than others. It must occur to you, that being the case, that the equipment which is of the greater age is going to require more attention and greater cost for maintenance.

This whole proposition seems to be up to you. You are a fair, honest, competent body of men and it only requires that all in authority should be absolutely fair in order to have this matter handled to the satisfaction of all.

F. F. Gaines (Cent. of Ga.)—I would like to ask one question. What are we to do, when we have the absolute proof that work has not been done and we have been billed for it? As I understand it, the Arbitration Committee will not handle a case of that kind. I had personal experience less than a year ago, where a road billed us for applying 15 5x7 couplers. We thought it curious that so large a number of couplers were applied in one place, and we got the cars home and we found that the couplers had not been changed, and yet we cannot take that case to the Arbitration Committee or refuse to pay that bill. There should be some way, when we find positively that the work has not been done, and can prove it, by which we can legitimately avoid the payment of the bill rendered.

F. W. Brazier (N. Y. Cent.)—The policy of the members of this association in this matter should be absolute honesty. As a general thing, what we should all practice and what should be in our rules is the Golden Rule. If we cannot trust each other, if you will not take my word, and I will not take yours, the M. C. B. Association rules might as well be thrown into the waste basket. I regret to say that on the road I represent we make mistakes, but I have a man that makes a false charge and I know it, he will not be in the service 24 hours. I have a special man who goes all over our system, whose duty it is to see that the New York Central gets every cent that belongs to it, but not one cent dishonestly. Neither do we make a bill for work not done, nor on defect cards where we do not do the work. We tear them up or return them to the owners. We are holding in Springfield, Mass., to-day a private line car that they will not take my word for, that they will not take Mr. Smith's word for. They tell me that car was put through their shops in December, overhauled. The car man who says they put that car through his shop and overhauled it is not telling the truth. There was scarcely anything done to it, beyond giving it a coat of paint. I have personally inspected the car. There ought to be some way by which these dishonest practices could be shown up. Now, I say that we have letters come to us—I am glad to say that we do not have many—sometimes questioning our charges. We look into it. We make mistakes. Our inspectors should be commended for the manner in which they have to get out in storms and serious weather to make their records, and they make mistakes in numbers. That is all right. But they should not make mistakes in saying they put on a brake-shoe unless they have done it, and we as the heads of departments should look into it. We of the New York Central Lines would thank anyone if he could find a case in which we have billed for a thing that we did not do. It looks to me like a simple thing to do. If we would all say that we would discharge a man that is known to do it, it would be a good thing. I do not believe in swelling up my showing on charges for foreign repairs, but if I do the work and do it honestly, I ought to have the credit. I have been reading with a great deal of interest Mr. Hennessey's remarks before the Western Railway Club. It seems to have become necessary for us to have to talk a lot about the application of repair cards. I take the word of Mr. Gibbs or anyone that writes to me on the conditions of our cars. I never question. Sometimes we write back and ask if they have not been in a wreck. Chief clerks, inspectors and others sometimes handle the correspondence and get a little overzealous, but when it comes to the heads of departments we ought to frown upon anything that looks like dishonesty.

Mr. Garstang—I am in full sympathy with what has been said. I am connected with a railroad where the foreign mileage is greater than the mileage of its own cars on the road, and there is a splendid opportunity for making bills and charges. I want to say for the information of the gentlemen here that the bills against the road that I am connected with, for the year 1908, were more than $140,000 greater than ours against foreign lines, notwithstanding that the foreign mileage was greater on our road than our own.

Mr. Hennessey—The question to be considered seriously, is, are we going back to inspection for protection, or are we going to inspect for safety? If we go back to inspection for protection, then this association has practically come to an end. If we take the position for one minute—and I am free to say I do not take that position and do not believe in it—I believe the heads of every car department in America to-day are honest Without honesty this association is a mere farce, there is nothing left of it so far as the interchange rules are concerned. But I am sorry to say that there are in my opinion a great many subordinates who are dishonest. They are small men and they think they are building up a reputation for themselves by pretending to do work that they have not done. Now, I could enumerate case after case, but that is not the question. The question to be discussed is the question of the remedy. We *must* remedy it. It is absolutely necessary. The railroads that send us here are going to demand it. Now, if we go back to inspection for protection, we tie up traffic. I believe sincerely that if every superintendent of motive power and head of car department would send out a circular letter, and say to every inspector, "If we find you making repairs without putting on repair cards you will be dismissed from the service,"—when I say that I do not mean impossibilities, we are not talking about the brake-shoe key nor a brake-shoe, nor an air hose that has to be put in in the yard—I do not think there is a gentleman in this hall that has ever protested a brake-shoe or a key or a hose—I am talking about the repairs that have been pretty extensively done on the repair tracks, and when a car is on the repair track there is no excuse, no honest excuse, for not applying the repair card. There is another question of importance. They make wrong repairs. Now, that shows that it is more indifference than anything else, that the foreman or the clerk is simply shifting responsibility. If I make wrong repairs to your car, a bill can be put on a defect card and a counter bill rendered for making it right, when you do the work. I believe there should be a resolution and that every man should get down to business and insist upon honesty on his particular line, and if that is done, I do not think we will have to bring this question up in this convention again. We did it in 1896, 1897 and 1898 right along. I want to know why we can't do it now. It is simply because things are running smoothly, nobody calls particular attention to it, it is left to this clerk and that clerk, to some inspector or foreman, who is making a little capital for himself. But we have got to return, gentlemen, to the principle of honesty. If we do not, this association is a farce.

E. A. Miller (N. Y., C. & St. L.)—I agree with Mr. Hennessey that it is incumbent on every railway official connected with the work of repairs of cars to impose it on the men making those repairs that honesty is necessary. But the fact is that we have that letter which has just been written, before this convention, and which shows conclusively that there is dishonesty. I can say to you, gentlemen, that I can duplicate that letter and give you facts that are worse than those represented here. There was laughter over the house when that letter was read, but it is a serious matter. It is a matter of dishonesty. As I said, that letter is only a duplication of a letter that went from my office to our auditor some months ago. I am not surprised that there are mistakes and errors in the vast amount of billing that is done. It has to be expected, but there is a vast difference between mistakes and errors and dishonesty. When we see our bills climbing up in about three months from $250 or $300 to $1,000, we naturally begin to think there is something wrong. When we trace the matter up we find cases similar to and worse than those given in that letter, where cars have had some repairs made two or three times over the same road. We get bills for cars that have been out of the builders' shops less than six months, for air-brake hose and wheels and all sorts of such dishonest usage. I am glad to say that those are rare cases. I am glad to say that I believe nine out of ten, or 99 out of 100, of the railroad men of this country are honest, but I want to say that the one-hundredth man needs to be made honest, and it is our place to make him so. We know the roads that are sending in bills that are not right, and it is our place to make them right. We should be able to do it. I do not know that I should continue this discussion. I do know that we have had the same experience and worse than the letter that has been read here recites, and I know that when we look it up to see what the repairs of cars were costing on that road, we found that that man was keeping up his car equipment at about 50 per cent. of what the average cost was over the country. His annual report showed that he was keeping up his car repairs at a very much less cost than any other road that we looked up was doing. Now, it looks as though in those cases the zeal of the men making the bills was encouraged by heads of departments.

H. Bartlett (B. & M.)—Mr. Lewis' statement shows a very serious state of affairs, and I am rather sorry that such is the fact, but in my opinion one remedy is that we do justice to the road that has made the repairs, or that has made the charges, and notify it of the fact, giving it a chance to remedy the wrong. If we do not do that I do not think we are doing justice to the road that made the bills. If Mr. Brazier or Mr. Hennessey have made bills against the Boston & Maine which are found to be incorrect, I think it is my duty to inform them and give them a chance to apply the remedy, when I am informed of the facts.

R. P. C. Sanderson (Virginian)—With reference to this matter there is a side of it I want to touch on a little bit. To illustrate the point, some years ago it was found in the office of the railroad that I was working for then, that we had a large number of cars passing a certain point on a connecting line, that had, I think it was, two brake-shoes and two brasses

applied. There were never more nor never less, as I remember it. It was checked up with the car record office, and it was found that every car that passed that point appeared on the bill. I didn't know exactly what to do, but I went to the interchange points, and stayed there long enough to have a very considerable number of cars jacked up and personally examined the brasses with the marks on them, for their newness or second hand condition of the brake-shoes, and to see whether they were new and where they came from. I took that record, waited till the bills came in, and found the same thing again. I then arranged to have the bills sent back to the office of the mechanical head of the railroad, and got a reply in due time from the master car builder of the road, with an endorsement on it that the bills were correct, that the work had been done, and it was sent back to me over the signature of the superintendent of motive power signed by his chief clerk. I did not believe the gentleman had anything to do with it or would have countenanced it for one moment. I carried the papers down to his office. He was out of town. He came in the next day, and he was very glad to see me, we sat down in his private office, talked for a few minutes about the weather, then I laid this batch of papers before him and told him I presented them to him without criticism for such action as he saw fit to take. He read them part way through and he was very much ashamed—very much ashamed. He called in his chief clerk and said to him, "Did you look at that correspondence?" He said, "Yes, I looked at it." "Did you look at it closely?" "Well, I saw that the master car builder had said that it was all right and I signed your name to it and sent it back." That was all that was necessary. There is where the whole thing lies. The man that is responsible for the action of his subordinates in too many cases does not see this correspondence. It is handled by chief clerks over his name. He is busy, he gets in the routine habit of signing his name right along, it goes backward and forward, and then these practices creep in. How many of the men here to-day who are the real car builders, the really responsible men, actually closely review the bills to look for these things? Very few. It is handled by clerks and becomes perfunctory. If we were able to handle it ourselves, personally, if we could afford or were allowed to employ men, practical car builders and practical inspectors who understood the honest purpose of this association to review those bills with the same criticisms with which they review the bills that come to them before sending them out, I do not believe there would be very much cause for complaint.

Mr. Hennessey—I want to make just one remark to the gentleman who said that the Arbitration Committee refused to arbitrate cases. The arbitration committee is a committee to define the rules, not to decide on the veracity of two conflicting men. Consequently, it is one of the cases where, when a dispute comes up and the man shows positive evidence that he did a certain piece of work, it doesn't make any difference what our opinions are in the matter, here is positive evidence before that committee that the work was done. The other fellow comes along and says that the car came back in two or three or four months, that he knows there was a standard knuckle, etc., but here was positive evidence by the gentleman that did the work. Now, what can the court do? It cannot go by what it thinks. It simply can define the law, and that is as far as the Arbitration Committee can go on the case.

Mr. Parish—In order to put this matter in such shape that we can do something with it, I would offer a resolution that all of the members of this association who have any evidence of dishonesty in the use of the repair card submit such evidence to the executive committee, who will undertake to investigate the whole matter thoroughly and handle it in such manner as seems best to the interests of this organization.

Mr. Stark—I will second the remarks of Mr. Hennessey, that it would be impossible to go back to the old system of protection, but on the other hand I am sure that some means has got to be taken to protect the integrity of this association. While I am representing private car interests I want to say that I represent more railroad cars than I do private cars. Repairs by foreign lines have gradually increased from year to year, brought about, I believe, to a considerable extent by the piece-work system, especially during the hard times. The foreman and inspectors will not scrutinize repairs made on foreign cars as they would on their own. I can present facts that are pretty closely parallel to those in the letter that has been mentioned, but I am not disposed to bring them out. But I think the time will come when we will have to have inspectors employed by the executive committee or the American Railway Association, whose business it will be to go about the country and investigate all the repair points, not only as to the observance of the repair card, but the instructions to the repair men. I had a bill recently where there were eight pairs of wheels charged to our company with all the flanges sharp, both wheels on the same axle sharp, eight pairs, and the wheels were all cast nearly on the same date, showing that they were originally mounted together. Now, that is an evidence of ignorance on the part of the inspector or the billing clerk.

The P. & L. E. during the same time removed 36 pairs of wheels and there was only one sharp wheel on the axle, and that company gave us credit for 36 good wheels. We all know that a man does not find two sharp wheels on the same axle more than once in a lifetime. I cannot say how many pairs of wheels are charged up on account of chipped flanges, or that the inspector failed to put on lugs, whether inside or outside, or that the repair man applied second-hand wheels, which was evidence that he did not inspect the wheels, but the billing clerk in the absence of that information, billed us for the wheels and they advised us that they had a record as to the location of the flange.

I made one suggestion yesterday, or repeated what has been asked by the railway clubs, for the further identification of parts, and we received as much support as any other subject that was brought before the Arbitration Committee, and yet they turned it down. Now, that would be a step in the right direction, and, I believe, gentlemen, the time will come when you will find it necessary to have inspectors. You cannot depend on our men, the representatives of these large systems coming here, and discussing matters, but it is the fellows like myself, who represent the small interests, that find out what there is in the charges, and pick it out personally. I do not mean to reflect on the men holding the larger positions, but their responsibilities are such that they cannot give those details personal attention. I heartily agree with the motion that is made, that everybody present to the Executive Committee his grievances, and then they can read between the lines and apply the remedy.

Mr. Parish—I just want to say one word more in connection with that. It should be distinctly understood that no case should be presented to this committee until it has been sent to the head of the department that is questioned. Now, our Executive Committee cannot attempt for one minute to handle any case on the simple statement that somebody has done something wrong, until it has been presented to the head of that department, and in that way we will get both sides of the case.

The president put the question on Mr. Parish's motion and it was carried.

DISCUSSION OF REPORT ON SIDE BEARINGS AND CENTER PLATES.

Mr. Smith—In making up the report your committee had in mind to make it, when taken in connection with the report of the 1908 committee, a summary of all that has been done from and including 1900 to date on this subject by all the committees of the association, so that a subsequent committee would not have to duplicate any of the work. We believe that no further progress can be made until the tests recommended by the 1908 committee are completed. Owing to the necessity for practicing economy that most roads have been working under for the past two years, it does not seem wise to ask at the present time for appropriations for the purpose of conducting tests.

For these reasons it seems best to suggest that any subsequent committee on this subject be composed of members of roads owning dynamometer cars and your present committee asks to be discharged.

Since coming to the convention I have received a letter from Prof. E. C. Schmidt, of the Engineering Experiment Station, University of Illinois, offering the use of the University's dynamometer car, and the services of such operators as it can supply, in making, under the direction of the committee, such tests as are desired, without charge either for the use of the car or for the services of the test operators. This offer was made with the consent of the authorities of the University, and of J. G. Neuffer, Superintendent of Machinery of the Illinois Central, between whom the test car is jointly owned.

J. F. DeVoy (C., M. & St. P.)—I do not believe the dynamometer car will tell you anything about the relative difference in center plates and side bearings. In a test of four trains using two different types of engines between Milwaukee, Wis., and Brookfield, tests of identically the same trains resulted in a difference of approximately 6,000 lbs. in tractive power, due to the different journal temperatures, it was contended by one of our superintendents on the division on which we were operating, that there was a difference in the pulling of the trains in the night time as compared with the daytime. That cannot be demonstrated, for the facts were absolutely the reverse of what he had suggested. He said

that due to moisture and other conditions at night the engine drivers would slip more and that the train would pull harder. It was just the other way. In the first test, which started at about 9 o'clock in the morning, when the journals were cold or frozen, we found it was harder to pull the train. The last test we conducted, which started at about 1 o'clock in the morning, proved that there was a difference of 6,000 or 7,000 lbs., due to the condition of the journals and possibly the lubrication. There was absolutely no change made in the four tests, other than on the last pull to set out one car on account of a hot journal. We have just finished building a new dynamometer car, one in which we proposed to test our larger mountain power, or in doubling loads, two engines, and the day before coming on here I finished up the last test of these cars with identically the same train and identically the same engine. Now, mind you, the same location of empty cars, the same number of empty cars, the same number of loaded cars over identically the same division, and this being in the summer time, everything being favorable, and there was a difference of 9,000 lbs. in tractive power in that train. So I say, as I said about two years ago at a meeting of the Western Railroad Club, that any test made by a dynamometer car with the intent to show that one side bearing or one center plate is better or worse than another, will be misleading if made in that way. I do not intend to say that there is a difference or is not a difference between side bearings and center plates of different construction; but I do say that there will be no more results in a test made in this manner than you can obtain in any other way. I have personally conducted dynamometer tests for eight years, and I know that conditions of different kinds will vary so much that the results obtained will be absolutely unreliable.

F. F. Gaines (Cent. of Ga.)—I will have to disagree with Mr. De Voy on that. Several years ago, on the road I was connected with at that time, we had two classes of 60,000 lbs. capacity cars. One of them had a good body bolster and a good truck bolster, and they were very free on the center plates. The other type was rather weak and rode hard on the side bearings. We all know there was quite a difference in the pulling of the two trains of different classes of cars, and after we had borrowed the Erie dynamometer car for some tests on locomotive drivers we decided to find out what we could about the cars riding hard on side bearings. Several tests were made and we got results showing that the cars riding on their side bearings were pulling about 75 per cent. harder than the free center bearing cars. I do not think there is any question but that you will find great variation between the cars with different kinds of side bearings and different kinds of center plates.

Mr. De Voy—I am often misquoted. I do not wish it to be understood that I am advertising any kind of side bearing trucks or anything of that sort to-day. I am calling your attention to the fact that in my opinion a test made by a dynamometer car, to prove whether or not the thing is true, is not the correct way.

Mr. Brazier—This subject has been up for a number of years and we do not seem to be getting any nearer to a solution of it than we have done in the case of the standard make of coupler. There is no question but what some form of yielding side bearing is desirable. When I started in the car department I was taught always to grease the center plates, to grease the side bearings and to give them a good clearance—at least three-eighths of an inch. If we paid more attention to keeping the side bearings clear under the present form of construction we would get better results.

We have had some experience with ball bearings for side bearings and also for center plates. I find that the balls break and embed themselves into the steel castings, and otherwise they have not been as successful as they might be; but I do think if we could have some oiling device to keep the center plates oiled and more clearance in the side bearings we might have better results.

C. H. Newton (Georgia Railroad)—I ask Mr. De Voy what he is going to suggest as an improvement in the method of testing the cars.

Mr. McIntosh—Some years ago the road I am connected with secured a dynamometer car from the Illinois Central and the University of Illinois to make a number of tests, and among the tests made were two that involved, first, pulling a certain number of cars having what we understood were weak body bolsters. The influence of the load depressed them sufficiently to come in contact with the side bearings. Then we hauled an equal tonnage of modern cars having rigid body bolsters, identically the same truck under the same conditions as nearly as we could secure them. If I am not mistaken, there was about 8 per cent. clearly shown in favor of the rigid bolster.

A. E. Manchester (C., M. & St. P.)—I will confirm what has been said by Mr. De Voy relative to the test in question. It was not a test to determine the pulling value of an engine or how hard the cars pulled, only to determine what was the difference between day and night work. The superintendent in question was about to issue an order cutting down the tonnage at night in order to make a surer handling of the train over this portion of the road. We started in at 9 o'clock in the morning with a temperature of 29 deg. The cars had been standing in the yard from the night before, when they had been weighed. The tests were conducted continually from that time until 2 or 3 o'clock in the morning, and at the time the last test was made. If I remember correctly, the temperature was about 38 deg. It had gradually warmed up a little, and it was a fact, as stated by Mr. De Voy, that the pulling of that train decreased from the first pull made at 9 o'clock in the morning, which was the heavy pull, to the last one made at 1 or 2 o'clock the next morning, by 6,000 lbs. The same cars were used, pulled up the hill and brought back, except that one car was taken out and another one of the same weight substituted on the last pull.

Mr. Onderdonk—I have been making tests of dynamometer cars for the last twenty years and I would like to say that when the conditions are made practically the same and the acceleration is properly taken care of, the dynamometer records will show very closely in the case of trains composed of the same cars, over the same track, with the same loads, and I believe the result can be obtained when the tests are properly run out to show the condition of the resistance of that train, especially on curves, where they have different forms of center plates and side bearings. In fact, we made tests of cars with different forms of trucks and have been able to check results with any number of tests which show up these comparatively slight differences.

As to temperature, there is considerable difference in resistance due to the temperature, and especially with the empty cars on a level division, where the percentage of resistance is mostly made up of the rolling friction and not to lifting the car up a grade. With empty cars, this has run from 9 lbs. up to as high as 14 or 15 lbs. to the ton, when the temperature was 10 or 12 degrees below zero. I think, however, with the tests made under the same conditions, and possibly running at an absolutely uniform speed, they will check up, and the differences between the side bearings and center plates may be determined. If that could not be done this way you could get a sufficient basis for a comparison by dropping the cars around curves.

F. M. Whyte (N. Y. Cent.)—The track can be easily duplicated. If we run over the same track, the temperature can be kept uniform, or the test made under uniform temperatures, with the same cars and the same locomotives, but the element of speed is the important one, and I think that cannot be controlled closely enough to get positive results.

A. Stucki—I would like to make a few remarks possibly tending to simplify the tests without introducing any matter of information. Take, for instance, the spread of the side bearings. It is my opinion we will not get any additional information from that. We know what the proper side bearing spread is. It lies in the center line between the top of the rail and the center of gravity of the car. If you are inside this location the car will roll on the truck before the car and the truck, as a whole body, will roll on the rail. If you are outside this location, under adverse track conditions and have a very stiff car, you have a tendency to tilt the truck under the car; in other words, you have a tendency for the inside wheel to rise and the outside wheel forms a fulcrum. Therefore I do not see exactly that we are going to gain anything by the test suggested. I may be wrong, but I would like to be corrected if I am.

The other point is that of side bearing clearances. In this test you are trying to get at the proper clearances, but you are all agreed that we know what the proper clearance is. It is actually nil. The smaller it is the steadier riding car you have, just as you have on passenger cars. Unfortunately, we cannot accomplish this, because the bolsters will sag and bind and prevent the truck from free swiveling. Some speakers have touched upon this subject already, and the question is, how close can we go with the wooden car? We know that ¾ of an inch and more is required, and this association has decided that ¼ of an inch is the minimum on steel cars with steel bolsters. If you are going to make your test, what does it show? I think very little, because if you equip your car with stiff bolsters and adjust them to 1/16 of an inch you will have excellent results, but you will not know what you are going to get with cars in service, so that in my opinion it is a question of the construction of the bolster more than anything else.

I want to mention another point where these tests could be simplified and the cost brought down far below what has been mentioned. It has been suggested that we should try plain ball and roller bearings. You will agree that a ball and free roller give similar results as to friction, and the only differ-

ence comes in in the rail, and you are not going to determine anything about the rail by the tests suggested.

One important factor that enters into this subject is the height of the center of gravity. You have different conditions with house cars and stock cars, especially double-deckers, superimposed loads, to what you will have in flat cars, and it looks very much as if this item should be varied, or at least considered, so as to take very bad conditions into your test; and a similar remark can be made in regard to the elevation of the rails. I think the report did not mention that.

Mr. De Voy—It has been properly asked what we had to demonstrate thus far, and one gentleman asked what could be substituted in place of the test made by the dynamometer car. We have talked a lot about this since we came down here yesterday. Mr. Manchester said to me that we had to prove something, and he felt like spending some of the company's money in doing so. He asked me if I knew how to prove this, and I had in mind some dial and measuring arrangements from which I think we can get some results. I know it is not right for a man to stand up and say these things are wrong unless he has a remedy. It is a serious thing, and we must prove that we have a remedy.

I have heard the statement here a number of times that the center of gravity of your car makes a great difference. Can you imagine a car loaded with lumber, in which the floor is, say 50 inches from the rail, and then can you imagine a car floor which is 42 inches from the rail loaded with pig iron. There will be a difference of 7 or 8 inches in the center of gravity, and how any man can say that just the location of the side bearings, in connection with the top of the rail and center of gravity of the car, has anything to do with it is more than I can understand. What we started to talk about was side bearings.

Mr. Sanderson—As a member of the committee I wish to state that it has labored pretty faithfully on this thing, and it has been going on for a long time. There are so many variables, and some of them have been discussed here, and the gentlemen do not agree on the effect of the variables, that any tests, which would be conclusive and sufficiently complete, covering all the variables, would have to be a very extensive series of tests. They would cost a lot of money, take a lot of time, and many of our men who are very busy would not read them after they had been made and reported, because they would be too elaborate to digest properly, and the whole thing comes down to this: Is the game worth the candle? I would rather leave the answer of that question to the Executive Committee.

The subject was referred to the Executive Committee.

The Buckeye Steel Castings Company, Columbus, Ohio, showed the Major coupler, one the original design with a vertical lift for the uncoupling lever, the other a new model arranged for a side motion. In these couplers the knuckle has one inch deeper face and hub than has been provided in the past. This gives increased wearing surface and strengthens the knuckle about the pivot-pin hole. The pivot-pin lugs are also unusually deep and well reinforced. They also exhibited the Columbia coupler, which is remarkably simple in design and the uncoupling and lock-set device have a side motion for the operating rod. This rod is made of ¾-in. bar iron, with a loop in the end and is not easily bent or broken. The uncoupling feature of all these couplers should commend themselves to car owners, as they overcome to a large extent the objection found in most other fixtures of this kind. The Ohio passenger coupler was also included in this exhibit. This company showed also a cast steel truck frame and bolster for 80,000-lb cars. The side frame is arranged with blocks for the bolster guide, so that the bolster can easily be removed, and when guides become worn they are easily renewed. The side frame is made with the tee-bar cast integral, or for a bar iron tee, as may be desired. The Buckeye company are now manufacturing cast steel journal boxes, so thin that they do not weigh more than malleable boxes of the same size, and their strength is much superior to malleable iron.

The Keystone Drop Forge Works, Chester, Pa., had a line of sample drop forgings at space No. 375, showing the great variety of work it is equipped to handle at its works.

MAKING "THE DAILY."

THE ORGANIZATION FOR THE WORK.

Few people outside a newspaper office know about the work of getting out a daily paper, and this article is published to give our readers some idea of the huge task involved in producing not only a daily newspaper, but one requiring technical accuracy, and edited 140 miles (more than 3 hours) from the printing shop.

We show a picture of the members of "The Daily" staff here in Atlantic City. It is complete excepting two other stenographers; but the not least important workers of our force are at New York. The part they play appears later in the article.

The regular organization of the *Railroad Age Gazette* is divided into two departments, business and editorial, but the Atlantic City staff works as a unit in many respects. The division occurs when the duties belong strictly to one department; or the other. The business department handles all matters of business policy, the transportation of manuscript to New York, and circulation. The actual head of the business department of the *Railroad Age Gazette* is the vice-president and he is in active charge at Atlantic City. The members of the staff who report to him direct are Frank S. Dinsmore, L. B. Sherman, John N. Reynolds, C. R. Mills, Henry Lee, William D. Horton, Harold D. Horton and Morris M. Davis. Through John N. Reynolds, who has charge of circulating the copies of "The Daily" distributed at Atlantic City, the vice-president receives reports from Harold D. Horton, Robert M. Newhard, Jr., Raymond Dempsey and James A. Bradley.

The only direct work of the business staff of interest to the reader is the machinery that gets the copy to New York and distributes the papers here. The degree of success of any issue of "The Daily" depends largely upon the accurate working of that machinery.

All copy for the paper passes through one desk for final disposition—that of the managing editor; and just here the first responsibility of transportation begins. The first batch of manuscript for the next issue of "The Daily" is put in a suit case, tagged to New York and leaves the office on the pier at 8:20 a. m. in charge of a messenger, who gets it to the Reading station in time to put it aboard the 8:45 a. m. train for New York. By a special joint arrangement with the Philadelphia & Reading and the Central Railroad of New Jersey through the United States Express Company, the bag is carried to New York in the baggage car in charge of the baggageman. The train is met in Jersey City by a messenger from our New York office. This same operation is repeated in connection with the 2:10 p. m. train for New York, the messenger leaving the pier at 1:45 p. m. The last copy, largely the final part of the proceedings of the railroad association, leaves the pier at 4:20 p. m. and is taken all the way to the printing office in New York by a messenger. An automobile awaits his arrival at the foot of Cortlandt street at 8:08 p. m. At this stage every minute counts. A late train adds much to the difficulty of making a complete paper. Late matter that is essential to the paper of the day following is telephoned to the printing office in New York between 6 and 9 o'clock at night. The forms close for the press at 10 o'clock. Some manuscript for later issues of "The Daily" goes by mail, special delivery, every night at 10:30.

The work of getting the finished product to Atlantic City is in direct charge of the business manager, R. S. Chisolm, but the overwhelmingly important part of this work is done by the versatile Samuel O. Dunn, who watches the copy through the type-setting machines, the proofreading and correcting, and "makes up" "The Daily."

The papers intended for distribution at Atlantic City are put aboard the regular newspaper train that leaves from the foot of Cortlandt street, New York (Pennsylvania Railroad) at 2:05 a. m. This train is met on its arrival at the Broad street

station, Philadelphia, at 4:17 a. m. by one of our men who sees to it that the papers are placed on a wagon without delay. He rides on that wagon to the wharf of the Philadelphia & Reading at the foot of Chestnut street and crosses the ferry to Camden. By another special arrangement between the railway and the express company, the bundles of papers are put in the express cars attached to the train which carries market produce to Atlantic City and arrives here, still in charge of the same messenger, at 6:20 a. m. The train is met by a corps of messengers and wagons and "The Daily" is on the counter and at the entrance to the dining rooms of thirteen of the largest hotels in Atlantic City before 7 o'clock. Each hotel in turn has a special list prepared by us giving the names and room numbers of many of the railway officers in attendance who want copies of "The Daily" put in their boxes for safekeeping.

From the description, it is perfectly clear that the machine has many cogs and some friction wheels and that a slip would be bad. The machine works pretty well, but it has slipped. To illustrate the strain under which the transportation force alone works, we will give one incident that happened in connection with "The Daily" of June 18. Word was received at the office of "The Daily" on the pier at 2:45 p. m., Thursday, that the representative of the express company had placed our bag on the 2 p. m. train for Philadelphia instead of the 2:10 for New York. This particular bag contained most of the proceedings of the M. M. meeting for that day, and a lot of other important descriptive matter of the kind that means eternal damnation to members of the staff if omitted on a certain date, or if a letter in a name happens to have taken a notion to get out of place on its round trip between here and New York via the print shop. The business department got busy. The bag had been ordered held at Camden for further instructions. The superintendent of the express company at Camden was reached by telephone and his orders from us were: "Select the best man you've got; give him the suit case and tell him to catch the first train out of Philadelphia for New York; not to stop until he reaches there, and to spare no expense." Word was received here at 4:15 that a special messenger had caught the 4 o'clock train via the Reading. We got his name and a description of his looks. The business manager in New York was reached by telephone and instructed to meet the express messenger on the arrival of the train at Jersey City. The delay was only 40 minutes, but it meant a naughty word. Incidentally, before the papers were put on the wagon at 2:05 the next morning, one press and a stitching machine had broken down—but the papers caught the train!

. Workers on "The Daily" at Atlantic City.

THE EDITORS' WORK.

The work of the editorial department is much complicated by the fact that the editors are 140 miles from the printing presses. Moreover, the conditions surrounding the daily use of copy are very exacting; little flexibility is possible. The editor cannot know certainly which convention reports are going to be reached and discussed until the day's session is nearly over. He is continually receiving small pieces of news which must be handled both with speed and with precision, and it was necessary to devise a system which would come as

closely as possible to taking care of these things automatically.

First in importance comes the convention reporting. The meetings are held in the Greek temple, which is separated from the *Railroad Age Gazette* office by about $700,000 worth of the Million Dollar pier. Back of the curtain at the rear of the hall is the stenographers' room, where Mr. Crossman and his highly expert staff take the record. A messenger calls for the typewritten sheets as fast as they come off the machines and wires them to the two editors, Bradford Boardman and Charles H. Fry, who are in charge of this work. One of the two is always in the hall and one in the editorial office, and each edits and prepares for the printer the discussion which he himself has heard. Copy closes for the second train at 1:30 p. m., and the edited convention matter, right up to the time limit, is placed in the hands of the managing editor, who "sizes it up" and puts a serial catch number on each sheet of copy. From 1:20 to 1:40 the air around the editors' desks is tense with rapid work. For reasons which will be explained, the managing editor must keep an exact record of each bit of copy and must know just how much room it will occupy in the printed Daily. This frequently involves listing, marking and estimating 60 or 70 sheets in the last five minutes.

The record system requires that the printers must set a slug at the head of each galley of type, telling the style, the serial catch number, the number of cuts, if any, and the day on which the copy is to be printed. To effect this, a condensed statement is put on each item by the managing editor. For example, No. 2—5089—N—6 Day, means that the item bearing the line is set in style No. 2 (leaded); that its serial number is 5089; that it has no cuts, and is for use on the 6th day's paper. In making up the paper, the managing editor gives the make-up man a daily list of "musts" by their serial catch numbers; it would be difficult otherwise to differentiate the short Conventionalities and Exhibitors and Others items. All convention reports bear serials beginning with 1; all feature articles with 4; etc.

Mr. Lane is in charge of the department of Conventionalities, and writes a good share of them himself, with great skill and appreciation of the sunny side of life. Mr. Lister edits the Exhibitors and Others items, assisting the business department, which makes itself responsible for these notes before they reach the managing editor. Mr. Forsyth and Mr. Fowler write editorial paragraphs on the convention meetings and exhibits, and prepare special papers on mechanical topics. As soon as the convention adjourns, each day, the editorial office gets the make-up man on the long distance telephone and advises him how much copy has been sent. This estimate is necessarily incomplete; it is better to call it a guess, but it helps. The make-up man has an incredibly short time to get the copy in type and locked up in the forms, and it is important for him to have his own basis for judgment as early as possible. At 4:20 p. m. the last messenger leaves, taking a suit case of copy and going right to the printing office in New York with it. His instructions are to remain placid and undisturbed in the presence of train wrecks or earthquakes; to buy or charter anything from a mule to a locomotive, and to *get the copy to Dunn!*

At 6 o'clock the editorial office gets on the long distance telephone a special operator stationed in the New York printing office; gives the estimate of the copy which went at 4:20, and telephones the considerable amount of additional notes or "must" matter for the following morning's paper. Then the editing work for that paper is normally over—and the managing editor immediately prepares the trial make-up for the day next succeeding, and sends it off on the night mail.

This makes editorial office hours practically continuous from 7:45 a. m. until 11 p. m. The editorial staff thrives on this life, but knows every day that it is a long time from breakfast, at 7:15, to lunch, at 2:15!

The typesetting, printing and binding is done at the large plant of the Cherouny Printing & Publishing Company in New York City. In previous years this was done in Philadelphia. The work was transferred to New York this year, because of the large capacity of the Cherouny plant. The capacity of this plant made it possible to put the copy for the paper in type much faster than heretofore, but, on the other hand, the distance from Atlantic City to New York is so much greater than from Atlantic City to Philadelphia that the time between the hour when copy was received in New York and the hour when the printing of the paper had been completed was about four hours less than Atlantic City. In other words, the type had to be set and put in the forms and the presswork done in about four hours less than the same work was done in Philadelphia.

The "make-up" of the paper—that is, the editorial handling of the copy in the printing office, getting it put in type and in the forms—is in charge of Samuel O. Dunn, who was given this post of duty because of his long experience in journalistic work, requiring rapid action. This experience included eight years' service on daily morning papers in Kansas City and Chicago in a wide variety of editorial capacities.

The first copy of the day is received by special delivery mail in the morning. The report of the day's proceedings in the convention is sent in two sections, the first being received at the printing office in New York at about 5:30 p.m and the second at about 8:30 p.m. There is, of course, for each day's Daily a considerable amount of matter put in type in advance, and the work of putting this in the forms is begun at 3 p.m. The real rush of work does not begin, however, until the first instalment of copy is received from Atlantic City at 5:30 p.m. This instalment includes not only the first part of the report of the day's proceedings in the convention, but also always includes a large number of "conventionalities" and of items and articles for the exhibitors and other departments. Ordinarily five linotypes are kept continuously at work, but when the first copy for the day is received the number of linotypes used is largely increased. For example, at 5:30 p.m. on Monday, June 21, there were received at the printing office in one bundle over twenty columns of copy. This was immediately turned over to Mr. Brandes, the foreman of the composing room, and in a few minutes eleven linotypes were putting it in type. Usually, in handling the make-up of a technical paper, it is possible accurately to estimate, before the work of making up is begun at all, how many pages will be required, but under the circumstances under which "The Daily" was issued this year this was impossible. The make-up editor could only estimate very roughly how many pages he was going to need when he began making up. For example, he estimated that for the issue of June 22, 38 pages would be sufficient. This was at 6 o'clock, but the copy kept flowing in until, at 9 o'clock, it was plain that 46 pages were needed and orders were issued to this effect. There was a tremendous rush from that time until 10:20, when the last form was taken to the pressroom. In spite of the fact that the ordinary number of reading pages in the daily is 30, and that on June 22 the number of pages run was 46, a large amount of matter which should have been used that day was left out because there was not space enough for it. Because of the utter impossibility, owing to conditions under which "The Daily" was printed, of accurately estimating in advance the amount of space required, it was necessary almost every day to leave out much that was "must" for that day. This will explain to readers why matter which they hoped to see in a particular issue did not appear at that time. It was not the fault of the editors at Atlantic City, nor, in fact, the fault of anybody; it was simply due to physical limitations that could not be overcome.

Presswork on supercalendered paper, with forms containing from 40 to 60 half-tone engravings, in the hot nights in New York, when, in one evening, 16 inking rollers melted and needed to be quickly substituted was a factor in the imagined uncertainties of putting bound copies on the truck at quarter

past 1 o'clock. But we never missed it. Considering the size of each daily (as many words as are in an ordinary-sized novel), the engravings to be carefully printed, the calendered paper, the few hours in the printing office and its time distance from the base of supply of each copy, this undertaking was more difficult than that of any daily paper in the world. It could not have been accomplished but for the great capacity and skill of the Cherouny Printing Company, the hearty co-operation of the railroad and express companies and the zealous team work of the staff of the *Railroad Age Gazette*.

IMPROVED TRUCK SIDE FRAMES FOR FREIGHT CARS AND LOCOMOTIVE TENDERS.

The Scullin-Gallagher Iron & Steel Company, of St. Louis, has recently placed on the market three types of truck side frames of improved design for freight cars and locomotive tenders. The type known as No. 100 is as shown in Fig. 1. The feature of this design is the removable bolster retaining bar or compression member, permitting easy application and removal of the bolster without disturbing the spring plank or cross-ties, which facilitate repairs and assembly of the truck. The lower portion of the frame is an I-beam section, and the upper portion a channel section, both of suitable area to withstand all stresses. The columns are full width the entire depth of bolster, giving additional wearing surface. The compression member is put in at a drive fit with machined joint. This bar is a heavy rolled section and is retained in position by two bolts with lock nuts whose heads are held in a recess.

The type known as No. 200, shown in Fig. 2, is of solid construction with the faces of the columns concaved a por-

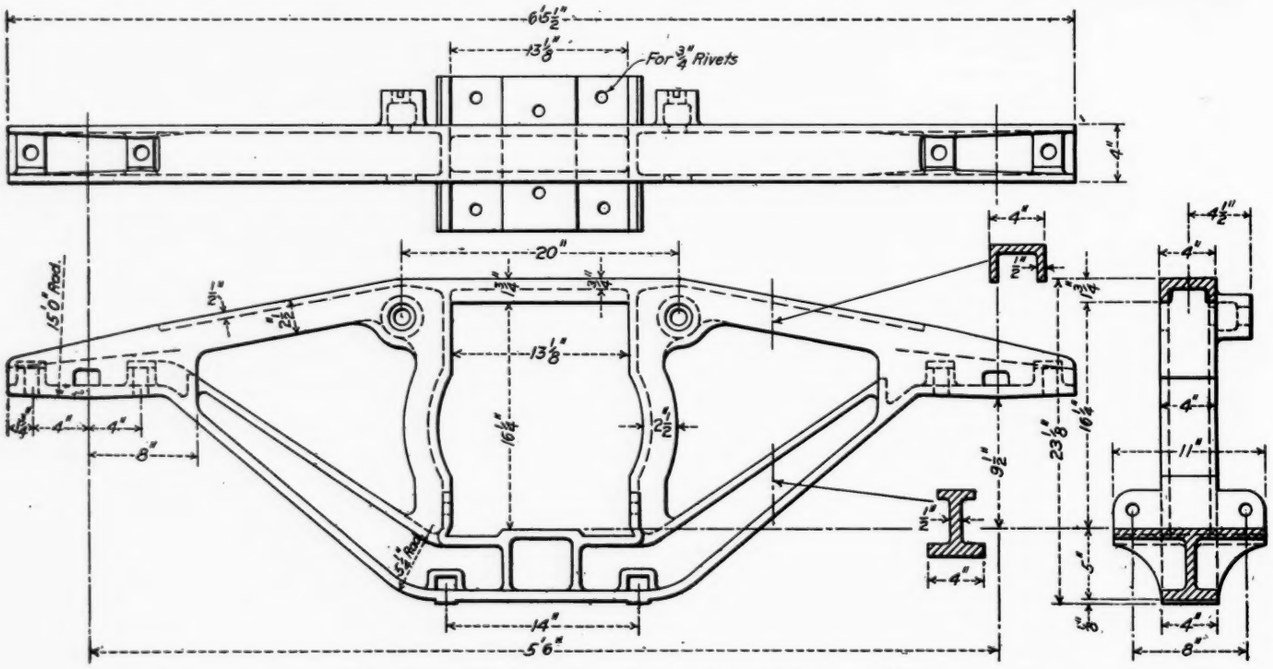


Fig. 2—Scullin-Gallagher Truck Side Frame, No. 200.

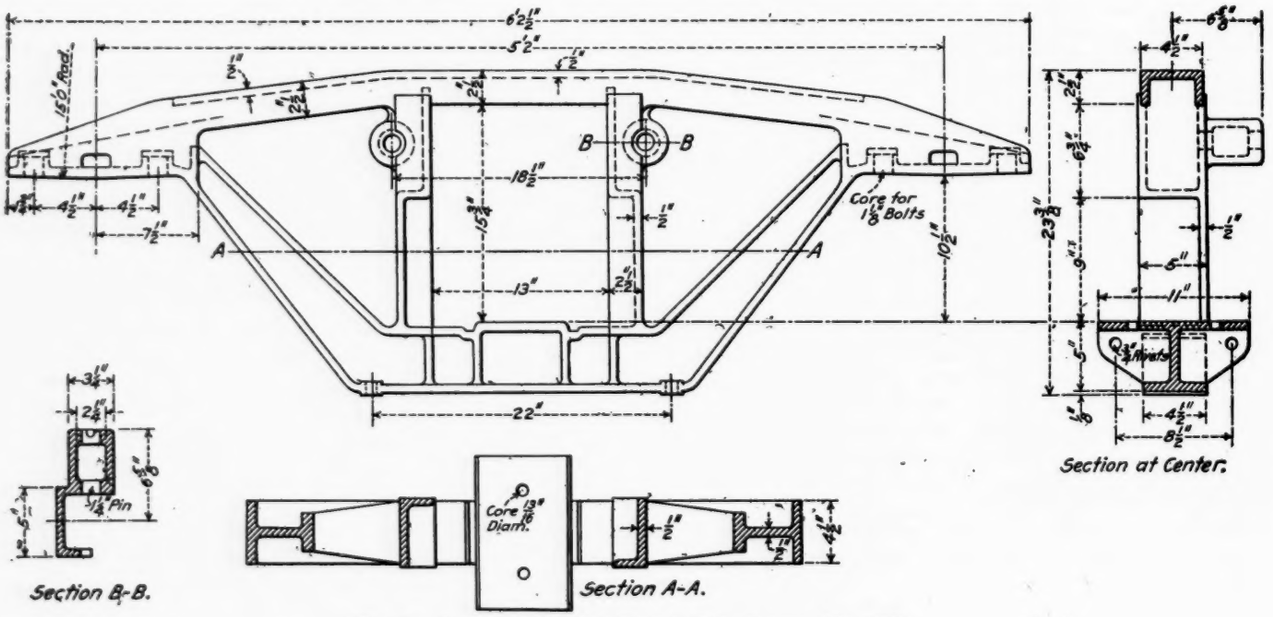


Fig. 3—Scullin-Gallagher Truck Side Frame, No. 300.

tion of their depth to receive the bolster. The application of the bolster is made by entering it sideways into the opening, then rotating it into the vertical position. This frame is also made of I-beam and channel sections of suitable area to withstand all stresses. The type known as No. 300, as shown in Fig. 3, is also of solid construction, with diagonally located recesses provided in the lower portion of the columns for the application of the bolster. This type is also made of I-beam and channel sections of suitable area. The bolster is passed through the recesses in the columns, then brought back into its normal position and moved upwardly between the columns.

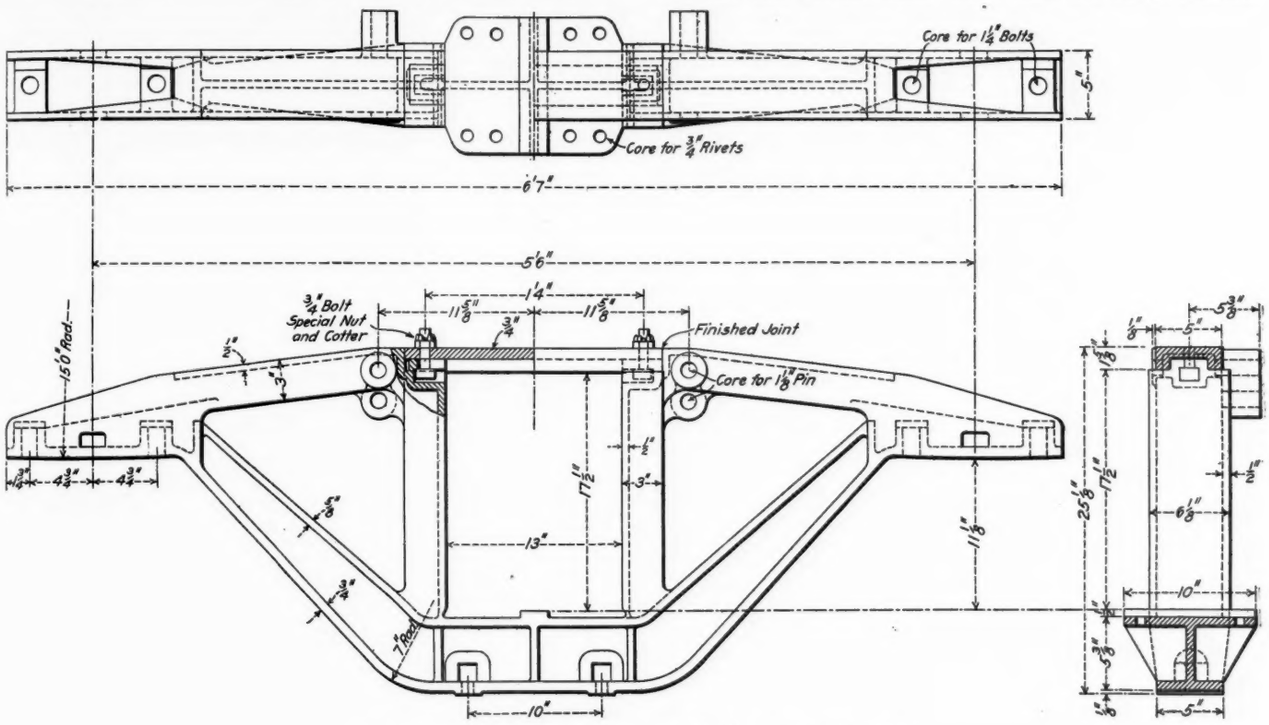


Fig. 1—Scullin-Gallagher Truck Side Frame, No. 100.

The features of these designs are their simplicity, minimum dead weight with maximum strength, ease with which the bolster is applied, thereby reducing labor of maintenance and the reduction of parts entering into the construction of a standard arch bar truck.

The Rockford motor cars, manufactured by the Duntley Manufacturing Company, Chicago, are having a large sale. Since the organization of the company there has been a greater demand for the Rockford cars than could possibly be satisfied. Eight hundred of their cars have already been ordered. Manufacturing facilities have been greatly increased lately, however, and orders are now being promptly filled. A well-known roadmaster in the West has just written the following letter to Charles E. Walker, manager of the railway department of the Duntley Manufacturing Company, after having given the Rockford cars most thorough service tests:

"Your No. 4 section motor cars are all doing as well as can be expected, considering the fact that we have no experts looking after them. We have not had anyone running the cars except the section foremen since the day they were started. With what instructions the foremen receive from me from time to time the cars are kept running and earning money for us every day, without any extra cost.

"We have used these cars on my entire division for the past four months, with an average cost per car per month of $3.47, including everything. They save many delays to our through passenger trains in stormy weather, when the track needs patrolling ahead of trains. The danger of being overtaken or met by trains has been reduced one-half because you are on the road only one-half as long; therefore, the danger of getting the cars struck by trains has been reduced just so much over the hand cars. These are only a few of the most important points in favor of the cars.

"I believe that I have demonstrated the practicability of using motor cars for section use, and by their use have reduced track expenses on my division 25 per cent. I also believe that in a very few years leading railroads will be using motor cars instead of hand cars all over the United States and perhaps all over the world.

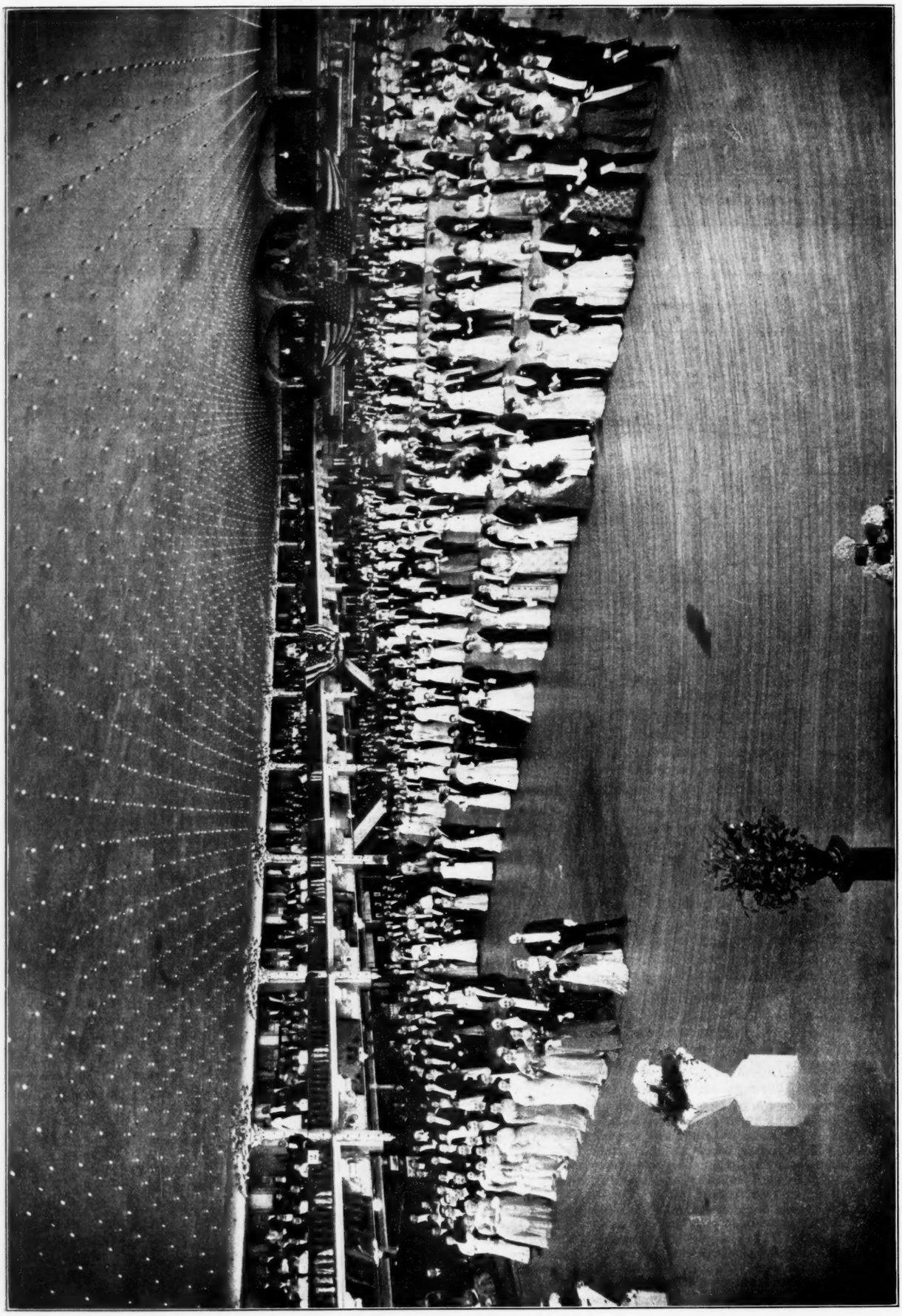
"During this period, while motor cars are being adopted for general use, the railways should turn their attention to getting a better class of labor for this most important work, maintaining the foundation of a thorough up-to-date track for the high speed and power of to-day. This accomplished then certainly the track department will have advanced not merely one step, but several steps with one leap.

"ROADMASTER."

The Rockford cars were fully described and illustrated in the *Railroad Age Gazette* March 19, 1909.

The Welsbach Company, represented by C. W. Wardell, is showing a most interesting device to prove the amount of vibration its new mantle, the "Reflex," will endure. Many railways are now substituting gas with Welsbach mantles for electricity in stations, shops and piers where a good light is necessary. The new mantel, perfected within the last six months, with the spiral anti-vibration fixture insures absolute freedom from jars caused by passing trains or trucking overhead. The Welsbach outdoor gas arc lamp is storm and insect proof. It is durable, reliable and simple and has low maintenance cost. It produces a brilliant white light of greater candle power efficiency and is more economical than any other arc lighting unit on the market.

A. M. Kittredge, president of the Barney & Smith Car Company, was most enthusiastic over the splendid exhibition of railway appliances. Mr. Kittredge was to be found among the exhibits most of the time. In summing up his visit to the conventions he declared that he could have spent a month in seeing and investigating the many displays of car parts and car construction found on the Steel Pier and on the tracks of the P. & R. Railroad.



Master Mechanics' Ball, Atlantic City, June 17.

TOPICAL DISCUSSIONS.

Wheel-Mounting Pressures for Various Sizes of Cast-Iron and Steel Wheels.

W. T. Gorrell (P. & R.)—I will give you what has been, and what is now, our practice on the road which I have the honor to represent. Our practice formerly was from 50,000 to 60,000 tons on the 7-in. face and better, and we had some burst wheels under that pressure. We changed from 45,000 to 55,000 on 7-in. fit. This refers to cast wheels. At least 50 per cent. greater pressure is used for steel wheels, which is our system, and I will state further that we had some loose wheels by using this pressure when we went below that figure. With about 75,000 tons for 7-in. fit, on 5½-in. x 10-in. axles, we are getting good results. I think this association should make some recommendations both on cast iron and steel wheels.

The President—This is a subject which has been referred to by the Committee on Subjects for Consideration in committee work next year, which is important. If there is no discussion on this subject we will proceed to the next topical subject:

"Cleaning of Triple Valves and Brake Cylinders on Freight Cars to Meet Interstate Commerce Commission Requirements."

T. L. Burton (C. of N. J.)—The scope of this subject is too broad to permit presentation without some preparation in detail. Your consideration is therefore requested in the following:

Mr. Burton then read a comprehensive paper on the subject.

Mr. Sanderson—I understood the speaker to urge that all the cleaning of the triple valves should be done by removal and replacement, taking them to the shop and testing them before sending them back. I want to say that that would run into money in great big figures. There are several kinds of triple valves of different make, the K2, K1 and H triples, 8-in. x 10-in. cylinders, and so on, and if we were going to carry out that practice as a standard required by this association in every case, the stock of triple valves would be something enormous. I think the railways would object, and as most of the cleaning necessary is purely cleaning and does not require replacement of parts or working over of parts, I think that would be an unwise and unnecessary burden of expense.

The Secretary—Mr. J. R. Alexander, Chief Air Brake Inspector of the Pennsylvania Railroad, is present to-day, and is interested very much in this subject. Mr. Alexander is also President of the Air Brake Association. I would request that the privilege of the floor be granted to Mr. Alexander.

Mr. Alexander—In listening to the reading of the paper by Mr. Burton, I concur in the general recommendations. In regard to the lubrication of triple valves, I might say that during the year 1903, when it became the practice to use air brakes more generally for freight trains, and the pressure on passenger trains was raised to 110 lbs., a great deal of trouble was experienced, due to the improper operation of air brakes, and most everybody blamed everything to the triple valve. In looking into the matter of a remedy, it was found that the triple valves were prone to work badly due to an accumulation of dirt in the piston chamber and on the slide valve chamber. The first remedy suggested was that of frequent lubrication. In fact, it was brought down to a period of every three months, and the trouble appeared to increase. The thought then suggested itself that perhaps there was an unnecessary amount of lubrication, and at that time—the fall of 1903—a number of trains having assigned cars were placed in service with triple valves rubbed entirely dry, no lubrication whatever on the slide valve or its seat or the piston or its chamber. From that day to this, with the difference of different cars on those same trains, they have been run continuously without any lubricant. In other words, no lubricant applied. But invariably in making an examination of those triple valves at periods of one month or six weeks, the inspector would report a slight amount of lubricant on the slide valve seat and also in the piston valve chamber, which led us to believe that a sufficient amount of lubricant came from the brake cylinder and from the gasket underneath the main piston. We are not prepared to say without question that that can be recommended exclusively as a practice, but we do say that it teaches us that the proper operation of a triple valve does not depend on frequent lubrication. It depends on thorough cleanliness and a very slight amount of lubricant being applied.

Another matter that we found to our satisfaction was that by being more careful with the amount of lubricant placed on the triple valves, there was less trouble in having the valves passed over the testing rack. In other words, with the lubricant of good character and excessively applied, they will not, any three in succession, give you the same results over the testing rack. In having them very sparingly lubricated, or with the entire absence of lubrication, we depend on getting more uniform results over the testing rack.

Another matter that appeals to me is that of testing the triple valves. The remarks indicate that every time a triple valve is cleaned it should be treated in the same manner as a triple valve that receives class repairs. We do not find it so in practice. As another gentleman remarked, it simply amounts to cleaning the triple valve. It comes in without question, there is no complaint of its being in defective condition, and it receives no attention whatever except to be cleaned and lubricated. That triple valve, to my mind, does not require the same rigid test that should be given the triple valve that has received a new slide valve, new piston packing, ring and general class repairs. The inspectors in the yards who do this work, we believe, can do it better, do it it in less time, by having it removed from the car and taken to a central point, where a more skilled man can give it attention, instead of having a number of inspectors give it attention on the car. Where outlying points are concerned we have found it economical to send clean triple valves to that point, and have them remove the triple valves and send them to the one central point. Previous to that method of doing the work one-half, or a large percentage, of the triple valves sent in for class repairs required no other attention than cleaning, and that will offset very largely the additional expense required to take the triple valve off and send it to a cleaner's testing rack, where it will be tested properly, to find defects that may make necessary class repairs.

A. W. Gibbs (Penna.)—Before Mr. Alexander goes I think he ought to say something about the effect of cold weather on the triple valves. My recollection was that that was one of the points, that cold water did not give us any trouble.

Mr. Alexander—In the test referred to, we did not follow through the summer months, for two reasons, possibly. One was that we did not think the summer weather cut very much figure, and the other was that the classifying of cars broke up in May on our line a good deal. But the cars that were on these particular trains in September and October had the triple valves cleaned, rubbed very dry, and an accurate record was kept of them, and instructions given to the men that would handle those cars to examine them once every month during the winter season, during the cold weather season, and it is strictly through the cold weather season in which our records stand as having had no trouble whatever with those triple valves. The weather two years ago was very severe. The criticism came to us from those who were interested in the subject that as soon as the zero weather came along the frost in the triple valves would seal the slide valve to its seat. We have never heard of any one case of trouble with the triple valve run absolutely without lubricant during the cold weather season.

W. E. Fowler (Can. Pac.)—The practice of removing triple valves for cleanings, instead of cleaning them on the car, is not impracticable. We have demonstrated that very satisfactorily on the Canadian Pacific, where every triple valve is cleaned, removed from the car and sent to a testing plant. It involves some expense of course, but the results we have obtained from it have more than compensated for the additional expense. We made a regular arrangement for that. We have boxes which will hold four triples, which we send out to the outlying points which are not provided with testing racks. Then these boxes are so arranged that the triples do not collide with one another and are not damaged, and the same boxes are used to ship back to the cleaning points triples which have been on the rack and tested. We have not very many cars, it is true, only about 50,000, but all our valves are cleaned in that way.

Mr. Burton—I might say a word in reply to Mr. Sanderson, though I think Mr. Alexander and Mr. Fowler have practically replied to him, that is, as to the removal of triple valves. As I said in my previous remarks, that has already been the recommendation of this association for seven years. I got my first idea of it down in Mr. Sanderson's part of the country, on the Nashville, Chattanooga & St. Louis, and it has been universal practice on all the roads with which I am familiar in the East for a number of years, and under no circumstances could you induce those roads to go back to the old practice of cleaning the valve on the car. As Mr. Fowler states, there may be some slight additional expense, and I believe there is. The road with which I am connected has destroyed so many triple valves during the last few years during the destruction of old cars that it fortunately has not bothered any in that respect.

There are three essential things to be looked after in the handling of the triple valve—the condition of the packing ring, the condition of the emergency rubber-seat valve and precluding as far as possible undesired quick action. Now, unless that valve is taken off the car and all its surface ports properly cleaned, you change the ratio of the port areas to the volume of air which must be handled, and if they are left on the car two or three years, we will get into some trouble.

The exhibit of the Gold Car Heating & Lighting Co., New York, was interesting and instructive. Its vapor system, while performing the functions of the most intricate systems, is very simple. The even temperature much desired by passengers is maintained at all times and the system requires very little attention by trainmen.

The Western Railway Equipment Company, St. Louis, Mo., was among the first to introduce the automatic brake slack adjuster on freight cars, and this device is now in use on a large number of cars. It was shown in the company's exhibit by a small model of a complete truck by which the action of the adjuster was clearly demonstrated.

The Commonwealth Steel Company, St. Louis, Mo., had no large exhibit of steel castings, but showed models of its numerous designs for the application of steel castings to the underframes of freight cars, passenger cars and tenders, as well as freight and passenger trucks. This company has been very successful in this work—so much so that they are able to make a complete tender frame in one casting. For cars it makes steel bolsters, end sills and complete trucks. The more recent designs for passenger cars are seen in the Jersey Central coaches, where the platform double body bolster and projecting lugs for sills are made in one integral casting. This form of construction has also been adopted for new steel sleepers by the Pullman Company.

Owing to the severe jarring and jolting to which a caboose is subjected, it is not the best location in the world for the health of a lamp chimney. The Storrs Mica Co., Owego, N. Y., recommends its various styles of mica chimneys designed for use on caboose lamps as being proof against breakage from jars or shock, as well as immune from the heat and cold breakage of the ordinary chimney.

The new truss brake beam of the Buffalo Brake Beam Co., New York, is known as the "beam with a back-bone." The name suggests itself by the arrangement of the compression member, which is made from a T section, with ends formed in such a way that it maintains its full strength from end to end.

On his departure for home C. A. Dunkleberg, treasurer of S. F. Bowser & Company, Fort Wayne, Ind., expressed great satisfaction and enthusiasm over the conventions just closed. The Bowser company occupied a large exhibit space in Convention Hall, showing its complete systems for oil storage and handling, and Mr. Dunkleberg believed that during the two weeks at Atlantic City all railway men in attendance had visited the exhibit.

A new type of temperature regulator was one of the features of the exhibit of the Gold Car Heating & Lighting Co., New York. This regulator is a combination stop valve and regulator which takes the place of the ordinary inlet valve. It is so constructed as to give and maintain any pressure from zero to 20 lbs, and can be applied to any car heating system.

R. W. Burnett, assistant master car builder Canadian Pacific, succeeds W. E. Fowler, whose resignation as master car builder on account of ill-health was announced a few days ago.

According to Official List No. 4, the registration up to Tuesday afternoon was 3,904. This total does not take account of possible missing numbers nor of duplicate registration, which would make some reduction. On the face of the returns there are registered 350 members of the Master Mechanics' Association, 350 members of the Master Car Builders' Association, 877 special guests, 641 railway ladies, 278 supply ladies and 1,408 supply men.

As predicted, the abolition of souvenirs at the request of A. R. M. M. and M. C. B. associations and the order of the Railway Supply Manufacturers' Association against distributing advertising literature among the exhibit booths did much to higher the standard of tone of the whole convention. The exhibit booths were not overrun by a lot of outsiders and the visiting railway officers found no difficulty in gaining easy access. That they took advantage of the opportunity thus afforded was clear to even a casual observer.

The Entertainment Committee caned Storrs, their chairman, in recognition of the hard work he did himself and made the members of the committee do. He even had one of them acting as check-boy at the Mendelssohn concert. The members of this committee are especially to be commended for their faithful attention to the duties they assumed and to be congratulated heartily upon the efficiency of their work. The regard in which their chairman is held is indicated by the presentation above noted. The cane is a beautiful piece of ironwood, silver mounted and suitably engraved.

The staff of the Union Twist Drill Company defeated a bunch of Westerners Saturday p. m. Theo. Oechsle, M.E., of David Lupton Sons Company, gave a fine exhibition of umpiring. Other features of the game were the first base playing of L. H. Swind, batting of W. B. McSkimmon and the fielding of Owens and Stedfast. We expect soon to see them as big leaguers. The score was 14 to 4 in favor of the Union Twist Drill aggregation. The other fellows couldn't get on to their "twists."

George H. Forsyth, president of Forsyth Brothers' Company, Chicago, was in Atlantic City for just about two hours on Saturday last. En route between Chicago and New York he stopped over only long enough to pay a hurried visit to his company's exhibit booth.

The many friends made by E. F. Leigh during his brief connection with the Chicago Railway Equipment Company will regret to hear that he has left the supply business, but will be glad to learn that he is now a "lumber king." Mr. Leigh has started a large lumber veneering plant in Holland, Mich., and the outlook and hope is that his success will some day result in his equipping his own cars with brake beams bought from his old employers.

It is not strictly true, as stated in The Daily on Tuesday, that I. W. Van Houten was president of the Master Car Builders' Association continuously from 1767 to 1873. The association is not quite so old, nor did Mr. Van Houten experience such longevity. It is pleasant, however, to note that with the exception of W. P. Appleyard, who met with an untimely death almost upon his return from the convention over which he had presided, all who have served as president since 1887 are living, and with the exception of John Kirby, whom advanced age and much hard work have entitled to a vacation from convention affairs, are present this year. He still retains his interest in the association's welfare, and has served as its treasurer for many years.

The photograph of the Wilson banquet on Saturday evening, of which a reproduction was published in "The Daily" of June 22, was made by the Geo. R. Lawrence Company, 1370 Broadway, New York. It is understood that the negative is preserved and duplicate prints can be obtained at any time.

It is noted with pleasure and with apologies to Kipling that at the annual ball game on Saturday there were no

"Flanneled fools on the bases,
Nor muddled oafs at the bat."

THE MACHINE TOOL EXHIBIT.

This year more than 50 machine tools are on exhibition, most of them in regular operation, cutting metal, and all driven by individual electric motors. The striking characteristic of many of these tools is their large size, their high capacity and rapid action. This is particularly true of the drilling machines, millers and shapers. A sensitive high speed radial drill, made by the American Tool Works Co., Cincinnati, O., has six speeds, 300 to 900 revolutions per minute. It has a record of drilling a ½-in. hole through 20 inches of cast iron in one minute. The vertical high speed drill, exhibited by the Cincinnati Bickford Tool Company, has the same capacity—and it will drill a 1-in. hole in cast iron 7¼ in. deep in one minute, or 2½ in. deep in steel in the same time. This company exhibits also a 5-ft. radial drill which is designed for driving high speed twist drills up to their capacity. Its maximum speed for a 2-in. drill is 357 revolutions per minute, and the rate for work on a cast steel locomotive with this size drill is 17 linear meters per minute.

Radial drills are also exhibited by Hill, Clark & Co., Manning, Maxwell & Moore and the Newton Machine Tool Works, the latter with a capacity up to a 4-in. drill.

Most of the milling machines shown are intended for heavy duty service, though none of the large slabbing machines are exhibited this year. Brown & Sharpe have two handsome millers, one a vertical machine with positive driven feeds and spindle, and longitudinal capacity 34 in. The other has a horizontal spindle with capacity up to 50 inches, and is intended for milling heavy forgings. Hill, Clark & Co. have two millers made by the Milwaukee firm, Kearney & Weckers. The No. 2B universal miller has a range of speed 15 to 360 r.p.m. and of feed in inches per minute, ½ to 16. It is intended for tool room use. The other miller shown by this company is a plain machine with direct connected motor. Manning, Maxwell & Moore show a handy miller for tool room use.

Shaping machines have been wonderfully improved in recent years, so that their work is no longer confined to light cuts and finishing, but they are used for the heavy short work which was formerly done on a planer. They are made strong and stiff, and have speed regulations which allow of rapid changes without complicated gearing. Conspicuous in this line is the high duty shaper exhibited by Gould & Eberhard, Newark, N. J. It is motor driven and has an electro-dynamic brake with a speed regulator operated through the motor. It has a wide range of cutting strokes and no fast running gears which consume power, wear out, and make unnecessary noise. Another shaper with a number of modern improvements is seen in the large group of tools shown by the American Tool Works, Cincinnati. This shaper is directly driven by a 5-h.p. motor with electric speed regulation. The stroke is changed and fixed without stopping the machine.

One of the largest exhibits is that of Manning, Maxwell & Moore, which contains over a dozen large machine tools, with a special double head driving axle lathe lift on the station platform for lack of room in the exhibit hall. This group includes a heavy duty railway shaper which is equipped with a special knee table for machining locomotive driving boxes. The Walter H. Foster Company's large exhibit includes two shapers, one 15 in. and one 24 in.

The effort of high speed and high duty tool steel is seen in the heavy and strong character of the modern lathe, especially the turret lathe. A fine example of this type is the 28-in. motor drawn Pond rigid turret lathe with equipment for bar work up to 6-in. diameter. This machine is intended specially for crosshead pins, crank pins, cylinder heads, piston heads and similar locomotive details.

The same company exhibits a 16-in. Pratt & Whitney tool room lathe which sustains in every way the high character of the work of that well known firm. Among the turret lathes should be mentioned the 24-in. vertical machine exhibited by the Bullar Machine Tool Company, which is content to have this machine represent its work, as it embodies many features of the company's boring mills, which are so generally used in railway shops. The vertical turret lathe is based primarily on the fact that it is easier to lay a piece of work down than to hang it up, and the horizontal table renders chucking of heavy details an easy and simple operation. Lodge & Shipley are well represented by an 18 in. and a 24-in. screw-cutting lathe. These tools embody several important principles which are illustrative of the modern work of this firm and relate to the headstock, which provides open belt speeds for small diameters and finishing cuts. The spindle bearing upon which the accuracy of the lathe depends is relieved of belt pull. Wide belts are used and speed changes are secured without shifting belts.

The full swing side carriage turret lathe made by the Steinle Turret Machine Company, Madison, Wis., has the tool post carriage so arranged as to run past the chuck, giving a swing of 21 in. over the carriage and 24-in. over the Vs. This tool is exhibited by Manning, Maxwell & Moore, who show also a 24-in. Putnam gap lathe and a 24-in. Hendy plain lathe.

The 24-in. lathe made by the American Tool Works Company is motor driven through a patented geared head, and is strong enough to transmit to the cutting tool 30 h.p. and remove 625 lbs. of tough machinery steel per hour. This firm shows also a heavy 42-in. motor-driven planer, with 4-speed gear box mounted on a platform on top of the main housings. The motor and gearing are sufficiently strong to operate all four heads simultaneously at 50 ft. per minute with tools cutting ½ in. deep, $\frac{1}{16}$ in. feed, in cast iron, and a consumption of 21 h.p.

The Cincinnati Planer Company sent a 37-in. forge planer of the variable speed type, the four cutting speeds being 20, 24, 35 and 45 ft. per minute. The return speed of the table is constant.

The display of automatic machines is more extensive this year than before. Two Gridley automatics are shown, one 1¼-in. four spindle and one 4¼-in. single spindle. The former is used for finishing and threading bolts, pins, etc., and the single-spindle machine is an automatic turret lathe.

The National Acme Manufacturing Company, Cleveland, exhibits a motor-driven 4-spindle automatic screw machine. The rotary movements on the Acme are continually in one direction, and the threading operation is performed while the stock is stationary.

The Lassiter automatic nut reaming and tapping machine is exhibited in the large group of tapping and threading machines represented by the Walter H. Foster Company. In this machine there are two horizontal spindles for either reamers or taps, and there are two hoppers which have automatic devices for arranging the nuts on runways. The same company exhibits a 6-spindle staybolt-threading machine and a 4-spindle bolt turning and finishing machine, with heads for straight or taper fits, also a newly designed machine for squaring the ends of staybolts. This machine is automatic and does the work cold at the rate of 30 bolts per minute.

Joseph T. Ryerson & Sons have a large exhibit which includes a number of portable turning and key-seating machines which were shown last year, and in addition their new portable riveters, which are operated by internal combustion gas cylinders. In place of the air cylinder there is mounted on the yoke a complete self-contained power plant which may use gas or other fuels common in gas engine practice. A small electric motor is connected to a carbureting pump which forces the charge into the cylinder. The entire operation requires about one second. This system dispenses with the usual air compressor, receiver, hose, etc., and the cost of attendants for the compressor.

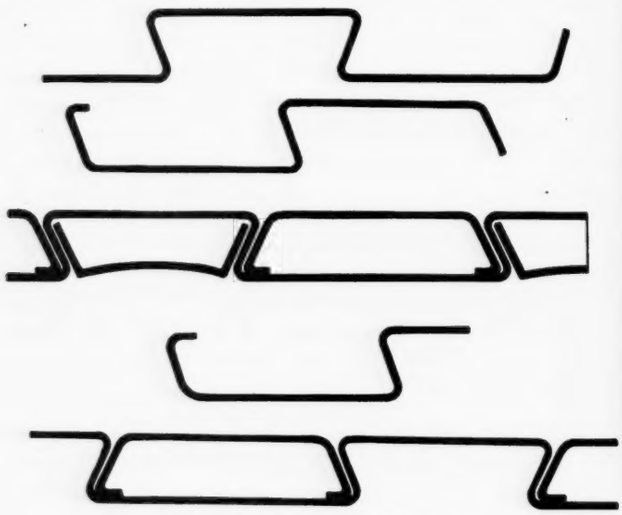
Manufacturers of grinding machines are well represented, and a special one for locomotive work is shown by H. G. Hammett, Troy, N. Y. This is a radius grinder for the links

of valve motion and link blocks. It will grind to any radius, and can easily be changed to a plain surface grinder. The Norton Company exhibits its large special gap grinder for piston rods, crank pins, valve stems, etc. It is now used on 17 railways, some of them having three machines. This company is now regularly manufacturing car-wheel grinding machines for slid flat wheels, and has a capacity of 22 to 25 pairs of wheels per day. The Landis Tool Company also exhibits a self-contained motor-driven gap grinder for piston rods and other similar details; also a No. 3 universal grinder for tool room use. The Walker Grinder Company is represented by two surface grinders. The smaller one is fitted with the integral magnetic platen, which does not require a positive chuck. Chas. H. Besly & Co., Chicago, show their double spiral disc grinder with lever feed table. This machine is quite generally used for polishing bolt heads and nuts.

There is not space here even for mention of all the machine tools exhibited, nor to describe any of them in detail. The aim has been to make a simple classification and refer to a sufficient number, so as to indicate the general character of the exhibit, and to mention some of the recent improvements which will interest those connected with railway machine shops.

METALLIC STEEL SHEATHING.

The accompanying cut shows five shapes of metallic steel sheathing, as used on wooden and steel frames of passenger cars. This is the sheathing shown on the stub end of a car by the General Railway Supply Company, Chicago, spaces 157-9. This sheathing is made of No. 17 gage steel plates, pressed into interlocking formations as shown. This sheathing adds but slightly to the weight of the car and serves the double purpose of a finish for the outside of the car and a dead air space for insulation. It also provides a surface that can



Metallic Steel Sheathing.

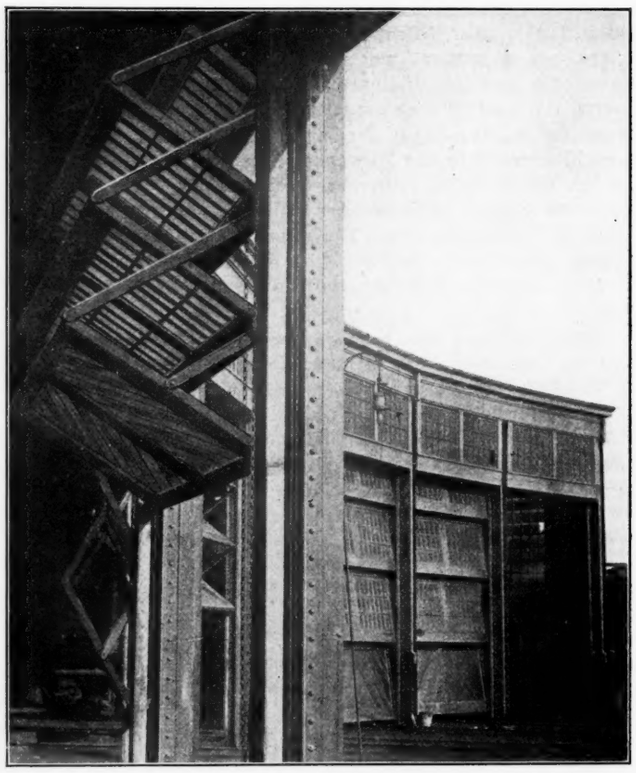
readily be cleaned, which is not the case when the rivet heads are left exposed on the outside of the car. It makes a very attractive exterior, is easy of repairs, being renewed in sections, while with the steel plate construction, it is necessary to renew the entire plate.

The following shapes are shown in the cut, reading from the top down: No. 1, sheathing panel; No. 3, sheathing slat; No. 1-A, sheathing panel; No. 3-A, sheathing slat, and Nos. 3 and 3-A, repair slat. Nos. 1-A panels and 3-A slats are the shapes being used by the Pullman Company on the all-steel passenger cars for the Pennsylvania. The fifth shape shown is the repair slat, which is used in conjunction with Nos. 3 and 3-A slats. These slats are applied at frequent intervals, and when the side of the car is damaged, it is only necessary to take out the damaged sheathing. In addition to this stub end of a passenger car, this company furnishes all other parts for steel exterior, namely, steel sash rest, letter-boards, window and door lintels, corner post casings, eave moulding, pilasters, curtain shields, etc.

RITTER FOLDING DOOR.

The accompanying illustration shows a section of the roundhouse of the Cincinnati, New Orleans & Texas Pacific at Ferguson, Ky. This roundhouse has 21 doors, of wood and glass. This style of door is said to have been adopted for roundhouse use after thorough tests and after a comparison in maintenance and operation between Ritter and other doors.

One of the chief features of this door is that it gives a clear opening, the door traveling entirely to the top. It is easily and quickly operated by one man. All moving parts are designed for simplicity and strength and the absence of springs and gearing is advantageous in this connection. Any or all sections may be glazed, or made of wood, plain or tinned, sheet or corrugated iron, reinforced cinder concrete, asbestos or any fireproof materials desired. When used as fire doors, a fusible link for automatic closing may be attached. Minimum headroom is required and but a small space for the operating mechanism and counterweight. The sections being



Ritter Folding Door.

inside the building, are protected from the weather when the door is open, and there is no swinging or banging by the wind or careless operators at any time. Maximum ventilating effect is said to be attained, the sections acting as louvres when the door is partly raised. The doors may be locked at any height, and will stay in any position without fastening. These doors are made by the Ritter Folding Door Company, Cincinnati, Ohio.

GENERAL RAILWAY SUPPLY COMPANY.

In addition to the stub-end of a vestibuled passenger coach, demonstrating the application and use of metallic steel sheeting, steel vestibule and trap doors, Garland ventilators and other specialties, the General Railway Supply Company,

Chicago, in its booth in Machinery Hall, is exhibiting three new devices for use on passenger car equipment.

The Imperial car window screen allows the sash to be raised to full height, giving clear vision and sufficient air, adding greatly to the comfort of passengers in warm weather. The screen is a permanent fixture and during the winter months, or when necessary to clean the windows, the screen may be raised to a sufficient height to be out of sight.

There is also on exhibition a roller deck sash ratchet, applied to a working model, which permits the deck sash to be opened at a right angle with three intermediate positions. This device is simple, positive in operation and inexpensive.

The perfection sash balance is applied to a window sash, the use of which allows the sash to be easily raised or lowered to any desired position, where the sash remains in perfect balance.

HOW TO BUILD STEEL CARS.

Having seen the exhibits of steel car and appliances there is one thing more to do and that is to visit the shops where they are built. At the Bettendorf booth 200, the various designs of trucks, underframes, etc., have been shown and all the features of design and construction have been explained. However, Bettendorf methods of manufacture are shown more in detail in the plant and the Bettendorf Axle Company, Davenport, Iowa, extends a most cordial invitation to railway men to visit its plant at Bettendorf Suburb, where they may see how cars, trucks, bolsters, underframes, etc., are built, and thereby have a better opportunity to examine the construction, as well as the design.

OXY-ACETYLENE WELDING AND CUTTING.

Great interest is being taken by the delegates in the practical demonstrations of the oxy-acetylene process of welding and cutting given by the Davis-Bournonville Company, New York, at the rear of the Greek Temple. This company uses the medium pressure torch, by which it claims to save one-third of the oxygen gas and to obtain a much better flame than is produced by either the high or low pressure systems. By putting the acetylene and the oxygen under pressure, a neutral flame is secured, which will neither carburet nor oxidize the metal being welded. The importance of such a flame cannot be overestimated, as a strong weld cannot be made where there is an excess of either oxygen or carbon. To the ordinary observer the difference in the flame will not be apparent, and for this reason it has been possible to put defective apparatus on the market, the bad results of which injures the reputation of the process.

One of the strongest features of the Davis-Bournonville process is its acetylene pressure generator. This generator is said to have passed the inspection of the National Board of Underwriters' engineers. This generator carries a pressure up to 15 lbs. With this pressure a supply of acetylene is provided for use with the thickest metals, and perfect control of the gases is obtained. This generator feeds lump carbide, which is said to not only produce from 5 to 15 per cent. more gas, but of a much better quality. It is the only pressure generator having powerful positive feeding mechanism, independent of the gas bell, and its gas is said to be superior to that of the water-to-carbide type.

This company has an arrangement with the Commercial Acetylene Company, Chicago, for compressed acetylene, which is especially desirous for portable work. The company is said to make the largest plants built, having a two-pressure system for welding direct or through piping, and also for supplying acetylene to a holder, from which it is compressed into cylinders for portable uses. The United States Navy is using this system as well as several large industrial concerns.

There is also exhibited a complete oxygen plant, including generators, gas holder and compressor, together with oxygen tanks and controlling devices. The cutting done at this exhibit is interesting, especially in the speed attained, narrow cut and smoothness of cut.

The T. H. Symington Co., Baltimore, Md., this year exhibited journal boxes showing an improvement in its now well known type of torsion-spring M. C. B. lid. The coil of the lid spring is set farther into the front opening of the box than the spring as originally made, thus reducing considerably the amount of projection of the hood of lid beyond the front face of box or lid joint. The hinge lug on which the lid is hung is strictly M. C. B. in all of its dimensions, and will allow the application of any strictly M. C. B. lid (pressed steel or malleable) on the market. Owing to the very secure special connection of the Symington type M. C. B. lid to the hinge lug of the box, the Symington Company states that, of many thousands of these lids in service to-day, there are no reports of lost lids.

GENERAL ELECTRIC EXHIBIT.

The principal exhibit of the General Electric Company, Schenectady, N. Y., is its self-propelled gasolene motor car exhibited on Mississippi avenue. This car has attracted much attention and caused favorable comment on account of the increasing interest of the railway companies in this type of car for the replacement of steam service on short branch lines. By the use of electric transmission between the engine and driving axles, the objectionable features of gasolene cars heretofore used have been eliminated.

The company has an attractive reception booth, number 317. The following representatives of the company are in attendance at the convention: W. J. Clarke, Manager Traction Department, New York; A. H. Armstrong, G. H. Hill, A. I. Totten, P. P. Spaulding, C. E. Barry, H. G. Chatain and A. W. Jones, Schenectady, N. Y.; T. P. Bailey, M. C. Corbin and R. E. Moore, Philadelphia, Penna.; H. D. Hawkes, New Haven, Conn., and A. E. Mason, Harrison, N. J.

The T. H. Symington Co., Baltimore, Md., exhibited a general line of malleable castings, illustrating its ability as a malleable iron foundry, to produce any kind of casting used on railway equipment or elsewhere. These castings show an excellent finish, and their quality is demonstrated by accompanying test pieces made from the same heats from which the castings are poured. The Symington company is not confining its malleable iron production to journal boxes, but announces its ability to take orders for miscellaneous malleable castings of the highest grade with respect to both quality and workmanship.

W. C. Ennis was elected an honorary member of the Master Car Builders' Association on Monday. As the universities have it, the degree was conferred *in absentia*. Mr. Ennis has retired from railroad service.

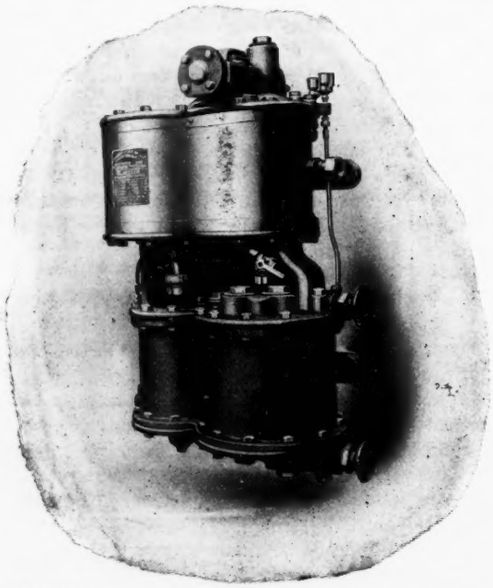
WESTINGHOUSE 8 1-2-INCH CROSS-COMPOUND COMPRESSOR.

Large capacity and low cost per cubic foot of air delivered constitute two of the important features of the Westinghouse cross-compound air compressor.

Large pump capacity is now regarded as essential for modern traffic requirements. Long trains and heavy cars, requiring larger brake cylinders and reservoirs, predominate, and the necessity of quickly charging trains at terminals and in yards, as well as maintaining ample pressure on the road to insure a prompt recharge and release of the brakes, all emphasize the need of large capacity for the work performed by the brake

system alone. In addition, many auxiliary pneumatically operated appliances, such as the Pullman water-raising system, bell-ringers, water scoops, track-sanders, engine-reversing apparatus, and the like, are now in common use and require an adequate air supply, which the air compressor must provide.

With the required increase in capacity came the necessity for reducing the cost per cubic foot of air delivered, which is accomplished by compounding both the steam used and air compressed. As a result, while the cross-compound compressor



Westinghouse Cross-Compound Compressor.

has a capacity over three times greater than the standard 9½-in. pump, the steam consumption per cubic foot of air compressed is but one-third.

The use of this large-capacity compressor is a decided economy, not only in relative steam consumption, but in the time-saving possible in getting trains out of the yard; ability to operate the brakes on the road properly, particularly in insuring normal release, preventing dragging of shoes and possible wheel sliding; reduced cost of compressor maintenance, and ample reserve for auxiliary apparatus operated pneumatically.

GEARING FOR SPINDLE SPEED AND FEED MECHANISMS FOR CONSTANT SPEED DRIVE MILLING MACHINES.

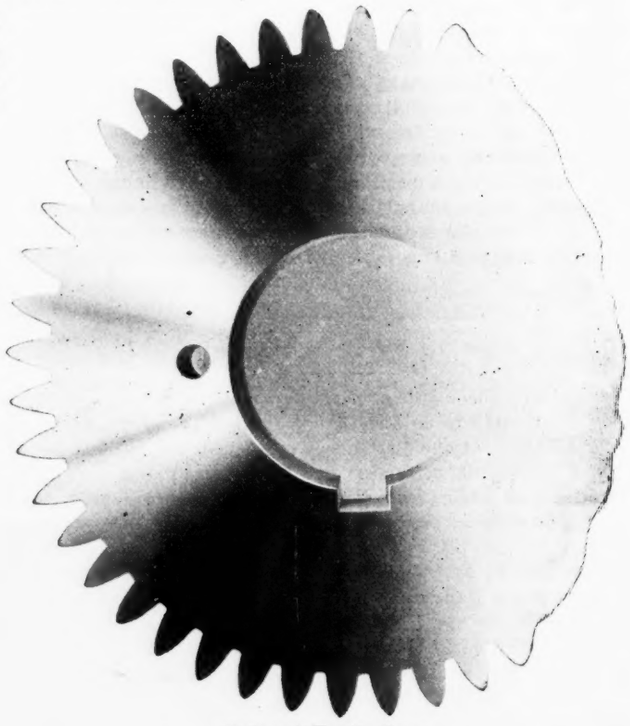
When the constant speed drive type of milling machine was designed, the question of construction and arrangement of gears for the spindle speed and feed mechanisms became one of considerable importance.

The constant speed drive was more particularly intended for use on the heavier classes of machines, and it was necessary that the gears be of sufficient strength to withstand severe strains; at the same time they must possess excellent wearing qualities, or durability.

Gears to meet the two requirements outlined above must be of large dimensions, and it was therefore necessary to arrange them in such a manner that gears of this type could be employed.

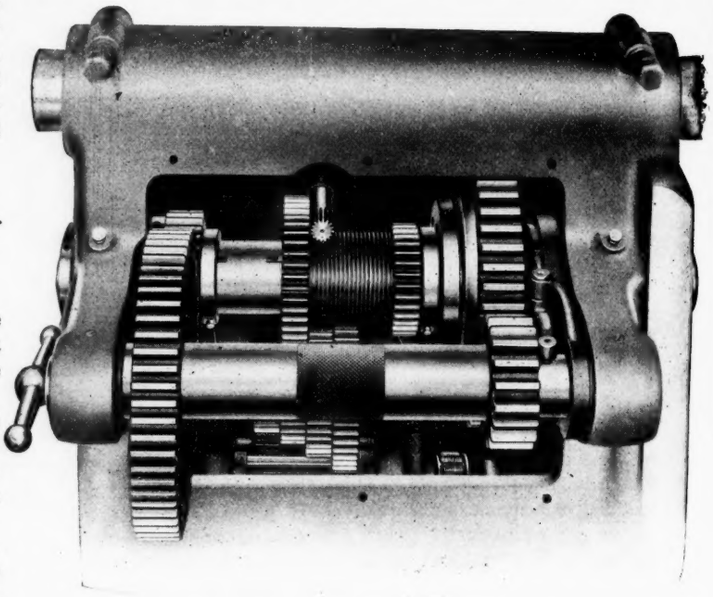
The designers of the machines built and exhibited at the convention by the Brown & Sharpe Manufacturing Co., Providence, R. I., worked out and adopted an arrangement of gears that, in addition to fulfilling the above requirements, embodied a number of other important features.

The large diameters, coarse pitches, wide faces, and rigid support of all driving gears in the spindle driving mechanism of this machine are readily discernable in the cut. The great strength and extremely rigid support of the tumbler gear (not shown), makes it fully capable of transmitting the full power of the machine under all conditions.



Pointed Tooth Gear.

The gears that are subject to being repeatedly thrown in and out of mesh are made with special pointed teeth and are hardened. Pointing the teeth facilitates instant engagement when the teeth are in any position. It also presents extra



Gears for Milling Machine.

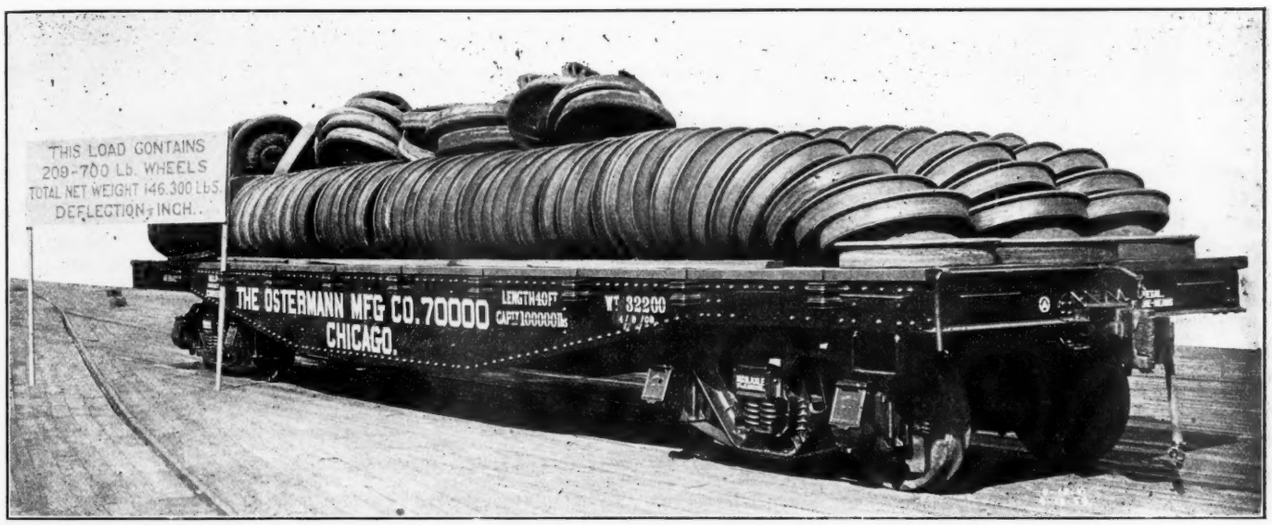
bearing surfaces and is therefore conducive to longer life and quiet running.

Hardened gears have been found to be best adapted to heavy service, and where the process is properly carried out the resulting gears retain their original strength and their durability is greatly lengthened.

The general construction of the gears of the feeding mechanism is very similar to that of the spindle speed gears shown above. One point of importance, however, is the sprocket chain drive. This chain is of sufficient strength for the most severe service, has interchangeable links and runs quietly when pulling the heaviest cuts. There are no gears to revolve idly in mesh when not in actual use in any part of the spindle speed or feeding mechanisms.

OSTERMANN 100,000-LB. STEEL UNDERFRAME FLAT CAR.

The illustration herewith shows a 100-000-lbs. capacity steel underframe flat car built by the Ostermann Manufacturing Co., Chicago, loaded with 209 cast iron car wheels weighing 700 lbs. each, or 146,300 lbs. total. The deflection under this load was ½ in. The car itself weighs 32,200 lbs., the body weighing 17,000 lbs., and the trucks, which are the Andrews steel frame type, 15,200 lbs. The length over end sills is 40 ft., width 10 ft. ¾ in., and height of floor from rail, 4 ft. 2¼ in. The distance center to center of trucks is 29 ft. and the truck wheelbase is 5 ft. 6 in. The car has a drop brake mast arrangement which is a special feature, and for which a patent has been asked.



Ostermann 100,000-lb. Steel Underframe Flat Car.

SCHOEN SOLID FORGED AND ROLLED STEEL WHEEL.

The first wheel rolled under the patents of Charles T. Schoen was rolled on October 5, 1903, at McKees Rocks, Pa., in what is now known as Mill No. 1 of the Schoen Steel Wheel Works of the Carnegie Steel Co., Pittsburgh, Pa. This wheel was forged and rolled from a cast-steel blank, and that process of manufacture was continued until about December, 1904. In spite of the defects inherent in all steel castings, the wheels so manufactured gave excellent service, owing to the work of reduction which they received in the process of forging and rolling. A few of these early wheels were put in use on the Intra-Mural Railroad at the World's Fair, St. Louis, Mo., and after the expiration of the fair were bought by the Metropolitan Street Railway of Kansas City and put in service. Two of these wheels traveled, together, 222,722 miles on this road in addition to about 24,426 miles at the World's Fair, and were removed from service in 1908 because their diameter was too small to permit motors clearing the paved streets.

About December, 1904, the present process of manufacture was adopted. It consists of the use of steel slabs, which, by reason of rolling on the ordinary rolling mill, have already received a considerable amount of the work of reduction before they reach the wheel plant, fitting them more perfectly for severe service.

The slab is first heated, subjected to rolling under a hydraulic press of 7,000 tons pressure, and sheared to a circular form. In this first forging the hub is raised by acorn-shaped dies. The steel is then reheated and forged under a second hydraulic press at 5,000 tons pressure. This forging produces the rough contour of the flange, and before the wheel is withdrawn from the press the rim alone is subjected to an extra forging operation.

From the second forging press the wheel passes to a punch where the metal left in the center of the hub by the acorn dies is removed. The wheel is then subjected to a wash heat in a heating furnace and rolled in a specially constructed machine which rolls the webs and the front, back and tread of the rim. The wheel next passes to the coning press, where it is dished and made truly round under 1,200 tons hydraulic pressure.

If the wheel is intended for freight service, the coning operation completes the manufacture of the wheel except for the machining of the front and back of the hub and the rough boring for axle fit, as freight car wheels are rolled to a finish only. If, however, the wheels are intended for engine truck, tender truck, passenger train car or street railway service, they are further machined on the treads so as to insure correct contour.

After the coning process the wheels are numbered consecutively by stamping the serial number into the hot web of the metal with steel dies, and the heat number of the steel from which the slab was obtained is also applied in the same manner. Prior to shipment the tape size or circumference of the wheel is stenciled on the web with white paint. The wheel number is of use for the proper identification of the wheel in service, and the tape size is placed on the wheel for proper mounting on axle, it being of the utmost importance that wheels mounted on the same axle should have the same diameter or circumference, as indicated by their tape sizes.

Briefly, the advantages of the solid steel wheel are:

1. Freedom from defects and failures, proved by the records of the large number of wheels already placed in service.

2. A large factor of safety against breakage due to the lateral strength of the flanges.

3. A maximum endurance to wear which renders the Schoen

steel wheel highly economical, as shown in the high mileage records. Very few wheels indeed have had to be taken out and replaced because of lack of endurance in the metal, and it is extremely difficult to estimate what the ultimate life of a wheel may be.

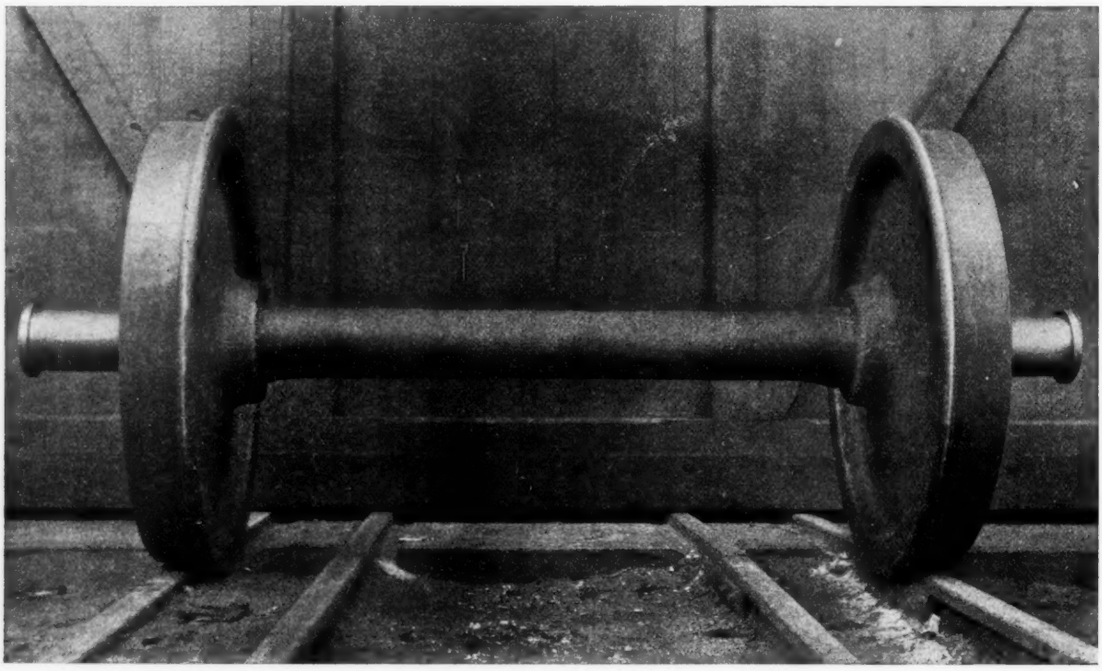
4. The practical uniformity of service wear, due to the homogeneity of the metal in the wearing body of the rim. This uniformity permits wheels when worn to be machined to a perfect contour and replaced in service.

A few examples of service under actual operating conditions will illustrate these advantages. The photograph shows two wheels which have traveled together on the same axle on the Bessemer & Lake Erie 76,698 miles without the need for returning. A similar pair now on exhibition at the Carnegie Steel Company's exhibit, spaces 455 to 459, have run under passenger cars 82,056 miles without turning. These are not particularly high records on the Bessemer & Lake Erie, as the wheels under coach No. 52, applied May, 1905, have run 145,803 miles; under baggage car No. 16, 123,305 miles; and under baggage car No. 13, 117,182 miles.

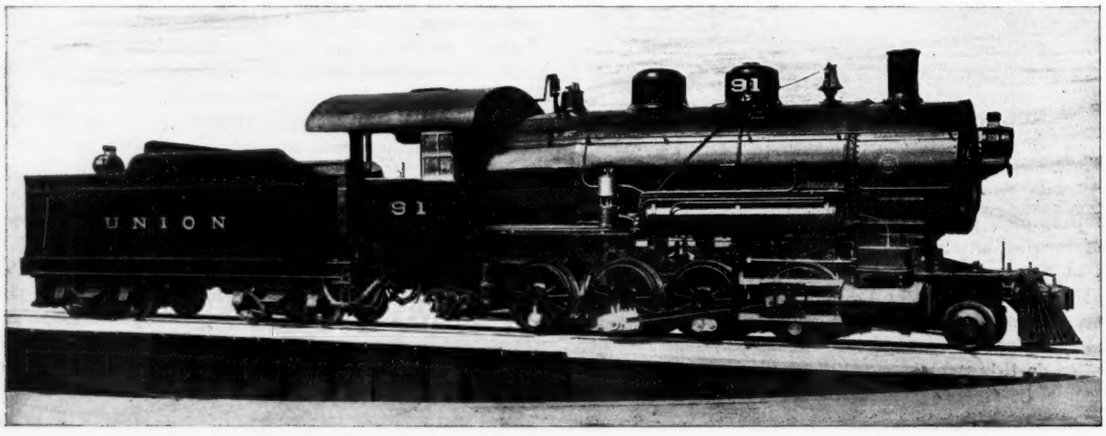
On another road in Pennsylvania, 12 wheels ran under a car weighing 154,000 lbs. 184,539 miles, with an average wear of 3/8 in., giving a mileage of 30,756 miles per 1/16 in. of wear. Also, 24 wheels made an average mileage of 109,018 miles before the first turning, showing 26,231 miles per 1/16 in. actual wear, or computed on the basis of the wear and the material turned off, 14,638 miles.

A lot of 36-in. wheels sold to a Canadian road ran as high as 114,563 miles before the necessity for the first turning. Two wheels put in service in 1905 were still in use on December 31, 1908, with a record of 245,633 miles; they had been turned twice.

Records do not indicate what, with proper care, the maximum endurance of the solid steel wheel may be, and the ability to increase or decrease the value of the wheel in service is not, after, all, in the power of the manufacturers, but lies largely in the hands of the user. This is a point well worthy of the closest attention. With due care the loss of the wearing body may be greatly reduced. Wheels should be mated according to their tape sizes. Finished bore should be smooth and true and the center line of the wheel should coincide with the center line of the axle upon which it is mounted. Trucks should be square and brake rigging kept in proper adjustment. Under such conditions in freight car service it is reasonable to expect 20,000 to 25,000 miles per 1/16 in. of actual wear, or 12,000 to 15,000 miles per 1/16 in. on the basis of wear.



Schoen Steel Wheels; Bessemer & Lake Erie Railroad.



Tender and Engine Truck Equipped with Schoen Steel Wheels; Union Railroad.